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Skeptical Inquirer

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Proof of ESP? Not Quite.

James Alcock Critiques the Bem Experiments

Seven Deadly Medical Hypotheses

Questioning IV Nutrient Therapy

Stem Cells' Rough Ride

Strange Problems in the Wegman Report

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[FROM THE EDITOR

Why the Bem Experiments Are Not Parapsychology's Next Big Thing

The world of news and blogs began buzzing in mid-November. A prominent psychologist, Daryl Bem of Cornell University, had posted a paper on his website in which he sensationally claims new experimental evidence of precognition, in this case implying that events preceded their causes. The paper has been accepted by a respected psychology journal. Is this the research that will finally give parapsychology what it has long lacked—laboratory evidence of paranormal abilities sufficient to impress mainstream science?

Fortunately, we at the Committee for Skeptical Inquiry and the SKEPTICAL INQUIRER have in our ranks numerous international experts on the claims of parapsychology. We called on one of them, psychologist (and CSI executive council member) James Alcock of York University in Toronto, to examine Bem's paper and provide SI readers and the public a considered critique.

Alcock's critical examination, "Back from the Future: Parapsychology and the Bem Affair," appears in this issue. It is a devastating critique. Before getting to the Bem paper itself, Alcock provides readers with a valuable reminder that we have been through all this before. He briefly catalogs an eighty-year history of next-big-thing claims in parapsychology, including J.B. Rhine's card-guessing experiments of the 1930s, remote-viewing experiments of the 1970s, ganzfeld experiments of the 1970s and '80s, and the Princeton Engineering Anomalies Research unit computer-based psychokinetic experiments of the 1980s and '90s. All provoked tremendous excitement in the world of parapsychology and considerable skepticism in the scientific world.

Today, none of these previous claims of experimental evidence for extrasensory perception have stood up. They have mostly fallen away, and some are seldom even mentioned anymore. It is a sobering—and very telling—history. Nevertheless, an open mind requires the examination of new claims on their own merits. Alcock does just that for each of Bem's nine experiments. He quickly finds disturbing problems, beginning with confusing and troubling changes in procedure during the experiments and inappropriate statistical analysis. Early on, Alcock expresses his frustration: "This is one of the most baffling descriptions of research methods and procedures that I have ever encountered." And at another point: "Just about everything that could be done wrong in an experiment occurred here." It gets worse from there.

I'll let you read the piece for yourself, and you'll see what he means. In the end, this appears not to be the experimental evidence parapsychologists have long sought. Alcock finds that the publication of this "badly flawed" paper will serve no one well—not parapsychology, not the psychology journal, and not the public.

I owe readers an explanation about one point. Alcock's article is longer than most we publish in SI. But we felt that Bem's claims, considering the public interest shown in them from the moment they became known, merited a serious examination—and that requires some space. We felt both the historical context and point-by-point examination Alcock provides are worth presenting fully for our intellectually curious and intelligent readers . . . not to mention the media and public, who look to us for authoritative perspective and judgment.

—KENDRICK FRAZIER

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CSI Committee for Skeptical Inquiry

Committee for Skeptical Inquiry

"...promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

Twelve Scholars and Investigators Elected Fellows of Committee for Skeptical Inquiry

Outstanding skeptics from five countries honored for 'distinguished contributions to science and skepticism.'

The Committee for Skeptical Inquiry announces the election of twelve outstanding scientists, scholars, writers, and investigators as Fellows. Election as a fellow recognizes "distinguished contributions to science and skepticism."

All of the newly elected fellows have made major contributions to science and reason, critical inquiry, and public education. They hail from the United States, the United Kingdom, Australia, Canada, and India.

The new fellows include science writers Sandra Blakeslee and Simon Singh; psychologists Anthony R. Pratkanis and Keith E. Stanovich; physicist Mark Boslough; physician and alternative medicine critic Edzard Ernst; and investigator/writers Benjamin Radford and Karen Stollznow. Several other prominent leaders of the skeptical movement have also been elected: Sanal Edamaruku, president of the Indian Rationalist Association and Rationalist International; Wendy M. Grossman, founder of the United Kingdom's *The Skeptic* magazine; Barry Karr, executive director of the Committee for Skeptical Inquiry; and Richard Saunders, vice president of the Australian Skeptics.

The Committee, established in 1976 and still popularly known as CSICOP, publishes the SKEPTICAL INQUIRER, the magazine for science and reason. The Committee "promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims." Fellows serve as formidable intellectual resources for the Committee and for the SKEPTICAL INQUIRER.

"We are pleased that so many distinguished scholars, researchers, academics, and people fighting for science and reason in the trenches as part of their daily lives and professions have joined with CSI," said CSI Executive Director Barry Karr. "We look forward to a busy and rewarding future and incorporating these new fellows into our activities."

Potential new fellows are nominated by existing fellows or by members of the Committee's governing executive council, and they are then elected by the executive council.

Combined with the sixteen new fellows announced last year (SI, March/April 2010), the new class brings the number of present Committee for Skeptical Inquiry fellows to 106. They come from Australia, Belgium, Canada, China, France, Germany, Italy, Mexico, the Netherlands, New Zealand, Russia, the United Kingdom, and the United States.

Isaac Asimov, Martin Gardner, Philip J. Klass, Carl Sagan, B.F. Skinner, and Nobel Laureates Francis Crick and Glenn T. Seaborg were all fellows of CSICOP.

Current fellows include such luminaries as evolutionary biologist Richard Dawkins, philosopher Daniel C. Dennett, physicist Lawrence M. Krauss, philosopher (and CSICOP founder) Paul Kurtz, cognitive scientist Steven Pinker, magician/investigator James Randi, physical anthropologist Eugenie C. Scott, astrophysicist Neil deGrasse Tyson, biologist E.O. Wilson, and Nobel Laureate scientists Murray Gell-Mann, Sir Harry Kroto, Leon Lederman, and Steven Weinberg. A full list of fellows appears on the inside cover of this and every issue of the SKEPTICAL INQUIRER and is also on our website at www.csicop.org/about/csi_fellows_and_staff.

Here are biographical sketches of the 2011 class of Committee for Skeptical Inquiry fellows:

Sandra Blakeslee
Science writer; author; *New York Times* science correspondent

Blakeslee has spent nearly all of her career writing about science for the *New York Times*, both as a staff writer and on contract. For about the past fifteen years she has been specializing in the brain sciences. Her latest book is *Sleights of Mind: What the Neuroscience of Magic Says About Our Everyday Deceptions* (2010), with neuroscientists Stephen L. Macknik and Susana Martinez-Conde. The book uses neuroscience to explain how magicians deceive us, why we are so vulnerable to sleights of mind, and how deception is part of what makes us human. Her previous books include *The Body Has a Mind of Its Own* (with her son Matthew Blakeslee, a fourth-generation science writer), *On Intelligence* (with Jeff Hawkins), and *Phantoms in the Brain: Probing the Mysteries of the Human Mind* (with V.S. Ramachandran). Blakeslee lives in Santa Fe, New Mexico.

Mark Boslough
Physicist, Sandia National Laboratories, Albuquerque, New Mexico

Boslough is regularly seen in science documentaries and news reports both explaining his research on planetary impacts and participating in expeditions to remote impact sites around the world. Exotic scenery and computer animations of catastrophic cosmic events make for good television, but Boslough has become an advocate for objective assessment of all risks to humanity, including those that are self-inflicted. He passionately defends climate science from political attacks and enjoys debunking the extraordinary claims of global-warming deniers. He advocates the use of humor as a weapon against pseudoscience. Boslough's most widely read piece is a thinly disguised spoof of creationists in the form of a satirical April Fools' Day news story, in which he wrote about a supposed vote of the Alabama legislature to change pi to its "biblical value" of exactly 3. It was widely mistaken as real. Boslough has a PhD in applied physics from Caltech.

Sanal Edamaruku
President, Indian Rationalist Association and Rationalist International

Sanal Edamaruku is a prominent writer, columnist, and television personality who is considered the most outspoken and dynamic advocate of rationalism in India. He is president of the Indian Rationalist Association and the founding president of Rationalist International. Explaining the science behind all kinds of "miracles" and exposing godmen, astrologers, faith healers, bigoted politicians, and fraudulent "modern" therapists on air, Edamaruku has broken the spells of countless paranormal and pseudoscientific claims and shaken deep-rooted beliefs in astrology, reincarnation, and tantric powers. Some of his interventions have led to the arrest of holy charlatans or helped control outbreaks of mass hysteria. For example, in 1996 he debunked the legendary "monkey-man" who had terrified New Delhi. In what is perhaps his most spectacular action so far, Edamaruku challenged one of India's leading tantriks to prove his claimed black-magic powers by killing Edamaruku with mantras and rituals on live television.

Edzard Ernst
Professor, complementary medicine, Peninsula Medical School, Universities of Exeter and Plymouth, Exeter, United Kingdom

Ernst, who holds both MD and PhD degrees, came to the University of Exeter in 1993 from Hannover Medical School (Germany) and the University of Vienna to establish the first Chair in Complementary Medicine. He is one of the world's leading and best-informed critics of alternative medicine. He has been awarded thirteen scientific prizes and awards and has more than one thousand publications in the peer-reviewed literature. Ernst has written more than forty books including, with British science journalist Simon Singh, the much-embattled 2009 book *Trick or Treatment? Alternative Medicine on Trial*, which forthrightly defends evidence-based medicine and assesses popular practices like homeopathy, acupuncture, and chiropractic. Ernst reports frequently about alternative medicine in the SKEPTICAL INQUIRER.

Wendy M. Grossman
Writer; founder and first editor, *The Skeptic* magazine (U.K.)

Grossman founded the United Kingdom's *The Skeptic* magazine in 1987 and has served twice as its editor (1987–1989 and 1999–2001). She also writes its column "A Skeptic at Large." Along with current *The Skeptic* editor-in-chief Chris French, she co-edited the 2010 book *Why Statues Weep: The Best of* The Skeptic. A freelance writer specializing in science and technology, Grossman is a frequent contributor to the *Guardian*'s technology section and has written for *Scientific American*, *New Scientist*, *Wired*, *Wired News*, and the *Philosopher's Magazine*. She has authored several books, including 2001's *From Anarchy to Power: The Net Comes of Age*. Her 1998 book *net.wars* was one of the first to have its full text published on the web. She sits on the executive committee of the Association of British Science Writers as well as the advisory councils of the Open Rights Group and Privacy International. Grossman also has what she calls "a disreputable past as a fulltime folksinger."

Barry Karr
Executive director, Committee for Skeptical Inquiry, Amherst, New York

Karr, the longtime executive director of the Committee for Skeptical Inquiry, is currently a member of the management committee of the Center for Inquiry and has served as the Center's executive director. A SKEPTICAL INQUIRER consulting editor, Karr has also contributed to or edited several books, including *The UFO Invasion*, *Science vs. Religion*, *Skeptical Odysseys*, *The Outer Edge*, and *Bizarre Cases*. He has served the Committee for Skeptical Inquiry (formerly CSICOP) for nearly thirty years with dedication and distinction. In addition to speaking and writing on skeptical issues, Karr works tirelessly behind the scenes. He deals with management and organizational matters, helps raise funds, tracks budget and finances, plans conferences and other events, edits the Committee's website (www.csicop.org), oversees media interactions, and keeps the organization moving forward.

Anti-Vaccine Doctor's 'Deliberate Fraud'

BENJAMIN RADFORD

Tom Miller/ZUMA Press/Newscom

An infamous 1998 medical-journal report by Andrew Wakefield, the doctor whose research sparked international concern over whether or not childhood vaccines cause autism, "was based not on bad science but on a deliberate fraud," according to Dr. Fiona Godlee, editor in chief of *BMJ*, formerly known as the *British Medical Journal*. The statement appeared in a January 5, 2010, editorial on *BMJ*'s website.

Author of the now-retracted article in *The Lancet*, Wakefield had previously been found guilty of acting unethically in his research on autism by a British panel. Dr. Godlee said *BMJ* and investigator Brian Deer uncovered "clear evidence of falsification" of Wakefield's data. Godlee's editorial states that "Wakefield altered numerous facts about the patients' medical histories in order to support his claim to have identified a new syndrome.... But perhaps as important as the scare's effect on infectious disease is the energy, emotion, and money that have been diverted away from efforts to understand the real causes of autism and how to help children and families who live with it."

In "Secrets of the MMR Scare," the second part of a *BMJ* series of special reports on the scandal, Deer showed how Wakefield exploited the vaccine scare for his personal financial gain. Wakefield planned to make a fortune developing his own supposedly safer vaccines and diagnostic testing kits once the public's confidence in the safety of current vaccines was shaken. According to Deer, Wakefield expected to earn over forty million dollars each year from selling his diagnostic kits.

Toning Shoes Step into Court
Reebok and New Balance are among the companies consumers say make false claims for a better butt.
To read this story, visit **csicop.org**

Anthony R. Pratkanis
Professor of psychology, University of California, Santa Cruz

Pratkanis, a social psychologist, is an expert on economic fraud crimes, propaganda, marketing and consumer behavior, and subliminal persuasion. His research program has investigated such topics as the delayed effects of persuasion, attitudes and memory, groupthink, subliminal persuasion, mass communications, source credibility, persuasion and democracy, and a variety of influence tactics. He is coauthor of several books, including *The Age of Propaganda: The Everyday Use and Abuse of Persuasion* (with Elliot Aronson) and *Weapons of Fraud*: *A Source Book for Fraud Fighters* (with Doug Shadel). Pratkanis has written several memorable SI articles, including "How to Sell a Pseudoscience" (July/August 1995) and "The Cargo-Cult Science of Subliminal Persuasion" (Spring 1992). He also writes for popular periodicals, makes frequent media appearances, and has won awards for excellence in teaching and for "most revered professor."

Benjamin Radford
Investigator; research fellow, Committee for Skeptical Inquiry

Radford, a research fellow of the Committee for Skeptical Inquiry, is a premier science-based investigator of claims of "unexplained" phenomena such as ghosts, Bigfoot, crop circles, UFOs, lake monsters, and miracles. He is managing editor of the SKEPTICAL INQUIRER and helps shape every issue, writes articles and reviews, and authors its popular "Skeptical Inquiree" Q&A column. He also edits CSI's *Skeptical Briefs* newsletter. Radford is author or coauthor of six books, including *Scientific Paranormal Investigation: How to Solve Unexplained Mysteries*, *Media Mythmakers: How Journalists, Activists, and Advertisers Mislead Us,* and (with Joe Nickell) *Lake Monster Mysteries: Investigating the World's Most Elusive Creatures*. Through his columns, lectures, and media appearances, Radford educates the public about the nature of skepticism and science literacy.

Richard Saunders
Vice president, Australian Skeptics; educator; investigator; podcaster; Sydney, Australia

Richard Saunders says he owes his passion in skeptical activism to the examples set by Carl Sagan and James Randi. In the past decade, Saunders has created *The Great Skeptic* CD and the DVD *Great Water Divining* for the Australian Skeptics. He was also made the youngest president and a life member of the organization, co-founded *The Mystery Investigators* skeptical science show for schools, and founded Sydney Skeptics in the Pub. He was one of the organizers of TAM (The Amazing Meeting) Australia in 2010 and is currently the producer of *The Skeptic Zone* podcast. A frequent visitor to the United States, Richard has delighted in appearing at major skeptical conventions such as TAM8 and Dragon*Con.

CSI Helps Crack Los Angeles UFO Mystery

BENJAMIN RADFORD

Members of the Committee for Skeptical Inquiry were among the first to reveal the solution to a UFO mystery that made international news in November. A UFO, which appeared off the southern California coast on November 8, 2010, was captured in dramatic footage by a KCBS television news helicopter cameraman during sunset. The contrail-creating UFO was thought by many to be a missile, though military officials denied that any missiles had been launched in the area at the time.

With no immediate explanation for the strange object in the sky, the Internet soon buzzed with conspiracy theories about who might have launched the secret missile (foreign governments? a film studio promoting a UFO film? "black ops"?) and for what purpose. Some noted that the streak looked similar to ordinary jet contrails, but doubters countered by saying that contrails were different in some details and are almost always seen as horizontal streaks high in the sky—not more or less perpendicular to the horizon.

I was asked by LiveScience.com to review the evidence and offer my analysis of the UFO, which I did in a column posted just before 11 PM the day after the report. To the best of my knowledge, this was the first correct solution to the mystery posted on a major news or science website.

SKEPTICAL INQUIRER columnist Robert Sheaffer, on his recently launched *Bad UFOs* blog, suspected that the "missile" was in fact an airplane. This supposition was based in part on an analysis on the website Contrail Science: The Science and Pseudoscience of Contrails and Chemtrails (www.contrailscience.com): "The object seems to have been simply

an aircraft contrail, with tricks of perspective making it look like a missile flying away from you, when in fact it was an aircraft flying toward you. It depends on an effect of perspective." Furthermore, Sheaffer noted, this was not the

Simon Singh
Science writer; broadcaster; United Kingdom

Singh is a leading science journalist in Britain. After earning a PhD in particle physics at Cambridge and the European Organization for Nuclear Research (CERN), Singh joined BBC television's science department, producing and directing many science programs and documentaries. One such program led to his writing of *Fermat's Last Theorem* (retitled *Fermat's Enigma* in America), the first mathematics book to become a number-one bestseller in Britain. Subsequent books include *The Code Book*, *Big Bang*, and most recently *Trick or Treatment? Alternative Medicine on Trial* (with Edzard Ernst). His life took a big turn when he began investigating chiropractors. Singh became a hero in the skeptical community—and ignited a much-needed review of British libel law—after the British Chiropractic Association sued him for libel for a 2008 article in the *Guardian* examining claims that chiropractors could treat certain childhood diseases. Singh battled the suit despite high personal costs, and after two years the case was dropped and he was vindicated. The libel reform campaign his legal battle helped spark continues today and has more than 50,000 signatories.

Keith E. Stanovich
Cognitive psychologist; professor of human development and applied psychology, University of Toronto

Stanovich has been acknowledged by his peers as one of the most influential cognitive psychologists in the world. His research focuses on literacy, reasoning, and rationality. He has been ranked as one of the fifty most-cited researchers in his field and as one of the twenty-five most productive educational psychologists. He was given the prestigious 2010 Grawemeyer Award in education for his 2009 book, *What Intelligence Tests Miss: The Psychology of Rational Thought*. Other books include *The Robot's Rebellion: Finding Meaning in the Age of Darwin* and *Decision Making and Rationality in the Modern World*. Stanovich's introductory psychology textbook *How to Think Straight About Psychology* is used by more than 300 universities and is in its ninth edition. He has written more than 200 articles on the psychology of reading, reasoning, and cognitive science.

Karen Stollznow
Linguist; skeptical investigator; writer; podcaster

Stollznow, who has a PhD in linguistics, is a researcher for the Script Encoding Initiative at the University of California, Berkeley, and an adjunct lecturer in linguistics. She devotes her spare time to investigating pseudoscientific and paranormal beliefs and practices. She has written about a wide range of topics, including ghosts, psychics, UFOs, hoaxes, alternative therapies, conspiracy theories, cryptozoology, and cults. She has a particular skeptical focus on language-related phenomena. Stollznow is a host of the Center for Inquiry's *Point of Inquiry* podcast and a co-host of the *Monster Talk* podcast. She is a SKEPTICAL INQUIRER contributing editor and managing editor of the Center for Inquiry's *Scientific Review of Mental Health Practice*. She writes the "Naked Skeptic" column for the CSI's website and pens the "Bad Language" column for *Skeptic* magazine. Stollznow is also a director of the Bay Area Skeptics and a research fellow of the James Randi Educational Foundation.

Benjamin Radford

A vertical jet contrail photographed in Albuquerque, New Mexico, in early December 2010; the appearance of a contrail varies greatly according to temperature, light conditions, and weather patterns.

first time that a jet contrail had been mistaken for a missile launch.

It took a few days for the government to investigate the UFO and issue a report. When it did, Pentagon spokesman Colonel David Lapan agreed with me, Sheaffer, and other skeptics: "With all the information that we have gathered over the last day and a half about this condensation trail off the coast of southern California on Monday night, both within the Department of Defense and other U.S. government agencies, we have no evidence to suggest that this was anything other than a contrail caused by an aircraft."

Instead of clearing up the mystery for UFO believers, this explanation was widely dismissed and seen as a clumsy cover-up. Not only was the official jet-contrail explanation late in coming (while rumors and conspiracy speculation flourished), but the aircraft that supposedly made the contrail was not identified. Furthermore, several high-profile experts appeared on television suggesting that the UFO was in fact a missile; for example, Retired Air Force Lieutenant General Thomas McInerney was seen on Fox News stating unequivocally, "That is a missile launched from a submarine. . . . I am absolutely certain that is not an aircraft."

The jet-contrail theory had already been examined (and dismissed) by many people, and it was clear that corroborating evidence would be needed to show that other aspects of the case pointed to the same conclusion. To address the rumors, I wrote a second column on the Los Angeles UFO, this time for Discovery News. I examined the contrails theory afresh and did further research into the circumstances surrounding the sight-

ing. I also did some experiments to see if I could photograph ordinary jet contrails that might be mistaken for missiles (see photo on p. 8).

Was the jet-contrail explanation real or just a cover-up? Let's look at the evidence and compare the contrail explanation with the missile theory.

1) According to the Federal Aviation Administration, radar in the area did not reveal any fast-moving unknown targets. A missile would have been picked up on radar, while a jet would not have been flagged as unusual.
2) No trace of the alleged missile was seen falling into the water off the coast of Los Angeles, nor was a missile (or any part of it) recovered; it seems to have simply vanished into the sky. If the contrail was created by a plane, of course no falling missile would be seen or found.
3) The object seen in the video moves like a jet, not a rocket. As Michio Kaku, physics professor at City University of New York, noted on *Good Morning America*, "The trail seems to change direction. Ballistic missiles don't do that. It doesn't accelerate. Ballistic missiles accelerate up to 18,000 miles per hour, [but] this is traveling at a constant velocity."

   Although missiles accelerate greatly during launch, aircraft typically maintain a constant cruising speed after they have reached the desired altitude—exactly as the videotape shows.
4) There is no record of any missiles being fired at the location and time of the sighting, while there *are* records of commercial jets in the area at that time.
5) Perhaps most damaging to the missile theory, the only people who saw the mysterious phenomenon had similar vantage points: a television news crew videotaping the sunset from a helicopter and a few people in nearby Long Beach (such as photographer Rick Warren from his tenth-floor apartment). None of the other nearly four million people living in Los Angeles noticed the "missile," and pilots flying in the area did not report seeing anything unusual—certainly not a missile being launched. This is very strong evidence that the phenomenon was unusual from only one unique perspective; that is, people looking at the same thing from different distances and angles either recognized what it was or didn't think it was strange.

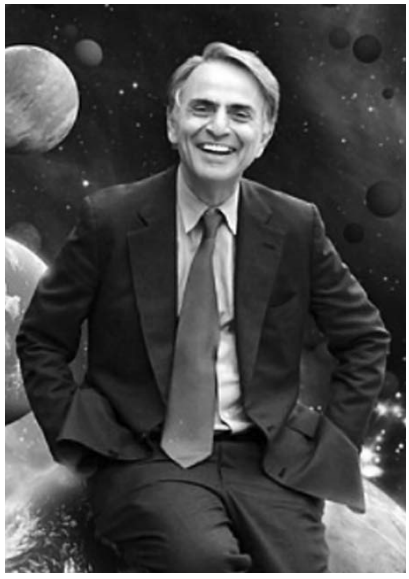
The explanation given by the conspiracy theorists who insist that the missile was some sort of secret U.S. government test collapses under the weight of its own illogic. Why would the government launch a "secret" missile only thirty-five miles from Los Angeles, where it would be obvious to anyone looking skyward? Furthermore, there would be no reason for officials to hide or cover up a launch; missiles and satellites are routinely launched from the California coast. All the Pentagon would have to do is issue a statement telling the public that it was a routine, planned launch, and the issue would go away.

As Robert Sheaffer noted in a follow-up post to his original blog post, the airplane that created the UFO was finally identified through careful analysis on the Contrail Science website: "Almost certainly it was UPS flight 902 from Hawaii to the Ontario Airport in California, the flight path using Google Earth matches up perfectly with the photos." Despite these skeptical analyses, many people remain convinced that the videotape shows some sort of secret missile or UFO. ■

The analysis that identified UPS flight 902 as the jet that made the mystery contrail is available at http://contrailscience.com/los-angeles-missile-contrail-explained-in-pictures. For more analysis, see Robert Sheaffer's *Bad UFOs* blog post at http://badufos.blogspot.com/2010/11/conspiracy-theorists-continue-to-flog.html.

Celebrating *Cosmos*'s Thirtieth Anniversary and Carl Sagan Day

Lauren Becker



Thirty years ago this past fall, millions of Americans sat down in their living rooms and watched a revolution in television programming: the first episode of Carl Sagan's masterpiece, *Cosmos*. Written by Sagan, Ann Druyan, and Steven Soter, the thirteen-part series won an Emmy and a Peabody Award and was the most-watched Public Broadcasting Service (PBS) series in the United States for twenty years. Since then, it has gone on to reach almost a billion viewers in over sixty countries, and it's still the most widely watched PBS series in the world.

We've been fascinated by the cosmos ever since. This past fall, science organizations, skeptics' groups, humanist groups, Center for Inquiry branches, campus groups, science classes, astronomy clubs, and countless others all over the world celebrated the thirtieth anniversary of *Cosmos*. Activities ranged from thirteen-hour viewing marathons in Australia to weekly episode screenings in Canada. Two CFI branches were even able to watch episodes on the big screens of major movie theaters in Chicago and Indianapolis!

continued on page 11

"It is error only, and not truth, that shrinks from inquiry."
– Thomas Paine

3 FOR TOMORROW

You are invited to join the Center for Inquiry to **Act**, **Combat**, and **Promote**…

Since 1976, three remarkable organizations have been in the forefront of efforts to promote and defend critical thinking and freedom of inquiry. The **Committee for Skeptical Inquiry** (founded in 1976), the **Council for Secular Humanism** (1980), and the **Center for Inquiry** (1991) have advocated, championed, and, when necessary, defended the freedom to inquire … while demonstrating how the fruits of objective inquiry can be used to understand reality, refute false beliefs, and achieve results that benefit humanity.

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CSI Fellow and SKEPTICAL INQUIRER Editorial Board Member James Alcock leads a class at a Skeptics' Toolbox event. The Toolbox has been held every year, except once, since 1992.

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The Center for Inquiry marked the occasion by commissioning exclusive, handmade ceramic necklace pendants based on some of the major themes of the series, such as "Extraordinary claims require extraordinary evidence" and the illuminating concept that we are all made of "starstuff." Other necklaces fondly recall Sagan's use of the word *billions* (although he never said "billions *and* billions") and the design of the phonograph record that traversed the solar system on the Voyager probes.

The *Cosmos* fun continued into November with the celebration of the second annual Carl Sagan Day. In 2009, CFI/Fort Lauderdale, Florida Atheists and Secular Humanists (FLASH), and other groups created the first Carl Sagan Day to mark Sagan's birthday, November 9, and the idea quickly spread. In 2010, groups from Alaska to New Zealand held star parties, astronomy lectures, science fairs, and more to say thanks to Sagan and to bring his work to the next generation of "starstuff."

As they did the first time around, CFI/Fort Lauderdale held the biggest event. Working closely with FLASH, the James Randi Educational Foundation (JREF), and Broward College, CFI/Fort Lauderdale brought together superb speakers, including James Randi, the acclaimed magician, skeptic, and founder of JREF; Nicole Gugliucci, a radio astronomer at the National Radio Astronomy Observatory; Russell Romanella, associate director of engineering and technology at NASA's John F. Kennedy Space Center; Jeffrey Bennett, astrophysicist and author; and John Boswell, creator of the musical web series *Symphony of Science*.

More than three hundred people attended the day-long event. In addition to the speakers, there were teacher workshops, science displays put together by local middle-school students, robot and rocket-launching demonstrations, activities for children—including an edible solar system—planetarium programs, telescope workshops, magic shows, and stargazing.

No other scientist has been able to reach, teach, and influence so many nonscientists in such a meaningful way, and that is why we honor Carl Sagan, remember his work, and marvel at the cosmos he helped us understand.

CFI/Indiana also held a day-long conference featuring Leonard Tramiel, physicist and science-education advocate, and Brian Murphy, director of Holcomb Observatory and Planetarium and professor of physics and astronomy at Butler University. Members of CFI/Tallahassee enjoyed a tribute to Carl Sagan by professor and Nobel Laureate Sir Harold Kroto, and many other groups attended special Carl Sagan Day planetarium shows, star parties, science lectures, and *Cosmos* screenings.

Elementary and high schools joined in the fun, too. Students at Roosevelt School in the town where Sagan went to high school (Rahway, New Jersey), celebrated by studying the stars and visiting StarLab, a portable planetarium that helps students understand astronomy.

Students in Douglas Ryan's integrated physics and chemistry classes at Round Rock High School in Texas had a particularly good day. Each class began by watching clips of interviews with Sagan and his collaborator and wife, Ann Druyan. The students pondered Sagan's famous "extraordinary claims" quote (a phrase he didn't originate but

Teacher Douglas Ryan and his physics/chemistry students celebrate Carl Sagan Day at Round Rock High School in Round Rock, Texas.

did widely popularize) and discussed how they could apply the concept to their own lives. Next, the students made birthday hats and adorned them with *Cosmos*-themed decorations. The highlight of each celebration was a visit from Ryan's former student, Cassie Landrum, who shared with each class how studying *Cosmos* had positively influenced her education and career: "*Cosmos* intrigued me with its ease of interdisciplinary ideas. I was able to think about science as Sagan presents it—as a historian, anthropologist, physicist, astronomer, etc.—[which] made it less daunting to me. I am still driven by the curiosity that drove Sagan and inspired by the interconnectedness of all the disciplines."

As news spread about Carl Sagan Day, it became clear how many people have been influenced by his work. The scientists at NASA's Kepler Mission held an essay contest based on Sagan's allegory of the "shores of the cosmic ocean" as developed in *Cosmos*. Winning entries—and many celebrity guest essays—can be read online at http://kepler.nasa.gov/education/sagan. Students on college campuses sponsored "Talk Like Carl Sagan" days, and nerdboyfriend.com offered advice on how to dress like Carl Sagan, complete with tan blazer and blue Oxford shirt. Ultimately, Carl Sagan Day was such a hit that it was the eighth-most-tweeted subject on Twitter the morning of November 10.

No other scientist has been able to reach, teach, and influence so many nonscientists in such a meaningful way, and that is why we honor Carl Sagan, remember his work, and marvel at the cosmos he helped us understand. We look forward to even more outstanding celebrations for Carl Sagan Day 2011.

(A very special thanks goes to Ann Druyan and Druyan-Sagan Associates, Inc., for their gracious permission to use images and content from *Cosmos* and for making it possible for so many CFI branches and campus groups to screen *Cosmos* for this special occasion.)

Lauren Becker is vice president and director of outreach at the Center for Inquiry. She may be reached at lbecker@centerforinquiry.net.

More Disconnects about EMF and Cell Phones

Robert L. Park

EMF Exposure: Does the Waving of the Trees Make the Wind Blow?

Identifying the cause of a disease is the first step in its treatment. Epidemiology, the branch of medicine concerning causation, seeks to establish correlation between exposure to a possible cause of disease and actual occurrence of a disease. Data must be taken over a period of years to allow for latency; if no disease is seen, a longer latency period is assumed to be necessary. When there is no record of individual exposure to a potential cause of disease, people are asked to recall what they did years earlier.

Exposure to electromagnetic fields (EMF) in modern society is ubiquitous, but it was not thought to be a problem until 1989, when the *New Yorker* began running a series of hopelessly misinformed articles by Paul Brodeur linking EMF to cancer. The articles were turned into a series of books with lurid titles such as *Currents of Death*. Brodeur had no background in science, but he managed to arouse the anti-science monster that had been in hiding since World War II. The media, trained to give both sides of the story even if one side has no science or evidence behind it, was of no help.

The EMF hysteria did not end until 1997 when the National Academy of Sciences, persuaded that the public would not accept an argument based on quantum mechanics, released a study that found no effect of EMF on the human body. Almost overnight, power lines were no longer believed to cause cancer. The anti-science monster had been chained, but it was still alive.

Almost overnight, power lines were no longer believed to cause cancer. The anti-science monster had been chained, but it was still alive.

Epidemiology: Fundamental Laws of Nature Take Precedence.

With the abrupt emergence of cellphone technology a decade ago, the anti-science monster talked its way out of bondage. Devra Davis, who is not quite a scientist but has a PhD in something called Science Studies, has donned the mantle of Paul Brodeur to write *Disconnect: The Truth About Cell Phone Radiation, What the Industry Has Done to Hide It, and How to Protect Your Family*.

Davis is making the same mistake that Paul Brodeur did: not recognizing that the universe is governed by quantum physics. Einstein pointed out a century ago that electromagnetic radiation behaves like units of energy called *photons*, equal to Planck's constant multiplied by the frequency. These photons don't cause any trouble unless their energy matches some natural excitation. There isn't much to excite them until they reach the energy of molecular vibrations in the microwave region. This is the part of the spectrum used in cell phones; in principle your cell phone might cook your goose—but it would take a very long time.

At even higher frequencies you reach the red end of the visible spec-

trum, then yellow, orange, green, and finally blue. It isn't until you reach the extreme blue end of the visible spectrum that there is a problem. At that level of energy, photons can eject photoelectrons, creating mutant strands of DNA that can become cancerous. This is the lowest energy level at which a photon can induce cancer. Photons of this energy are about a million times more energetic than a microwave photon, but they cannot penetrate very deeply and therefore induce only skin cancers. However, in December there were reports that children exposed to cell-phone radiation while in the womb have an increased risk of behavioral problems several years after birth. At this point we can expect wilder and wilder claims of effects from cell-phone radiation.

Robert L. Park is professor of physics at the University of Maryland and a Committee for Skeptical Inquiry fellow. This piece is from his *What's New* electronic newsletter, archived at www.bobpark.org.

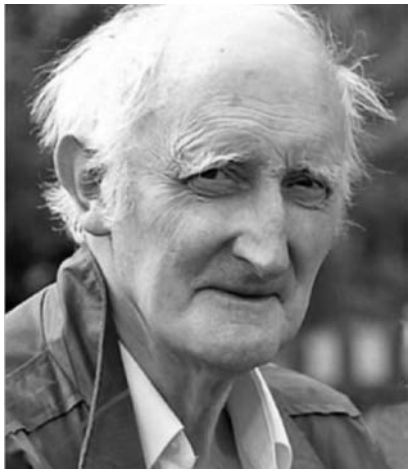
Cottingley Fairies Debunker Geoffrey Crawley Dies

ROBERT SHEAFFER

British photographer Geoffrey Crawley died this past October 29 at the age of eighty-three. He gained great repute in his field, serving as editor-in-chief of the *British Journal of Photography* for over twenty years. However, he is best remembered today as the man who definitively revealed what has been called the world's longest-running photographic hoax, the Cottingley fairies.

The story of the Cottingley fairies began in 1917, when ten-year-old Frances Griffiths and her sixteen-year-old cousin Elsie Wright snapped two photos that appeared to show the girls cavorting with fairies in the English countryside at Cottingley. The photos caused great excitement within the local Theosophical Society, a Spiritualist-oriented group with doctrines that included the existence of fairies. The photos soon came to the attention of Sir Arthur Conan Doyle, the famous creator of Sherlock Holmes, who was a dedicated Spiritualist. Doyle wrote a series of articles, and later a book, proclaiming the fairy photos as genuine. Many presumed that the photos had to be hoaxes, but it was never shown how they were made, and the girls continued to insist that the photos were authentic.

There the matter stood for over fifty years. Starting in the 1970s, Crawley undertook "a scientific and analytical approach" to the photos. He published a ten-part series of articles in the *British Journal of Photography* from 1982–1983, concluding that the fairy photos could not have been produced with the camera the girls used without darkroom trickery. As a result of Crawley's articles, and also of investigations by British journalist Joe Cooper, the cousins—now elderly ladies—confessed to the hoax in the early 1980s. Elsie simply copied drawings of fairies from a book onto cardboard, which the girls then cut out and held in place with hatpins. Crawley showed that retouching of the photos must have taken place. Cooper found an earlier, un-retouched version of "Frances and the Fairies" that was much less impressive than the extensively retouched version later published, thus proving that Crawley's analysis was indeed correct.



New Zealand Skeptics Leader Denis Dutton Dies

VICKI HYDE

We've lost another light against the darkness.

Denis Dutton died of cancer in Christchurch, New Zealand, on December 28, 2010, at the age of sixty-six. Dutton was a founder and member of the New Zealand Skeptics back in 1984 when it was known as the New Zealand Committee for Scientific Investigation of the Paranormal. For many years he was the face of organized skepticism in New Zealand, fronting up to the media with many a pithy comment and a wry sense of humor.

He had a deeply moral sense; he abhorred the exploitation we so often see underpinning skeptical issues. He reserved his scorn for the shysters willing to exploit vulnerable people for their own gain: psychics claiming to be in touch with dead loved ones and counselors who convince clients that their problems stem from suppressed memories of infant ritual sexual abuse. He spent year after year fielding calls about everything from alien abductions to moa sightings, managing to retain a sense of humor throughout.

What more could you wish for from someone once referred to as "New Zealand's Arch-Skeptic"?

Vicki Hyde is the immediate past chair of the New Zealand Skeptics.

New Age 'Power Balance' Bracelets Worthless
The manufacturer of Power Balance, the popular bands embedded with holograms said to adjust the body's vibrations, has admitted its product does not work.
To read this story, visit **csicop.org**

Washington Rally to Restore Sanity a Plea for Reason

BENJAMIN WOLOZIN

Media reports of Jon Stewart and Steven Colbert's "Rally to Restore Sanity and/or Fear" held on October 30, 2010, in Washington, D.C., largely described it as a lighthearted day of comedy. Having been at the rally, my sense is that the message driving the massive turnout of more than 220,000 people was much more profound. It was a rallying cry for reason.

Stewart and Colbert performed for three hours, criticizing the irrational and the alarmist rhetoric flooding our media outlets and appealing for "sanity." Many—if not all—of the readers of the SKEPTICAL INQUIRER are aware of the problem: many politicians and pundits routinely ignore scientific evidence, and the public follows their lead. Public figures seem to have perfected the use of the sound bite to appear thoughtful while irrationally dismissing scientific evidence on such subjects as evolution, global warming, or loss of biodiversity. Even debates on social-policy issues, such as health care, regularly avoid the most obvious, irrefutable truths: for example, the increasing cost of health care in the United States is driven in large part by the aging of our population (reflecting the success of medical science), and the elderly have more health care needs—and therefore more health care costs—than the young.

The routine is familiar. Evolution is dismissed by referencing the Bible. Global warming is dismissed by claiming that more evidence is needed. Strategies for avoiding evidence are highly effective for sound bites because they circumvent any need to describe what evidence would be considered acceptable and cogent. This journey into surrealism is particularly upsetting because it leads to bad policies that are ill equipped to cope with the very real challenges facing our society.

Listening to the news, I often get the feeling that my desire for "reason" in public debate is shared with only a tiny, isolated fraction of the population. Attending the rally, though, provided me with an entirely different, optimistic perspective. The crowd was immense, far larger than any of us who attended expected. People streamed into the National Mall from all sides, filling the streets from blocks away and packing together—shoulder to shoulder—on the Mall. The atmosphere was full of humor and festivity, but the humor reflected a surprisingly unified thoughtfulness. For instance, despite being packed together, requests from crowd members to pass others were met almost universally with the same response, as people stepped back and comically announced, "Yes! I will let you through, because I am a very *reasonable* person!"

Benjamin Wolozin is in the Departments of Pharmacology and Neurology at Boston University School of Medicine. He is a member of the Committee for Skeptical Inquiry's executive council. His e-mail address is bwolozin@bu.edu.

The rally was filled with thousands of homemade signs, most of which addressed the theme of the day in a manner that was both poignant and really funny (see www.csicop.org/rally for more examples). Some of the signs directly addressed the need for reason in American political debates. For example, one sign proclaimed, "It's your brain, Use it!" Other signs mocked signs that are often used to convey extremist views at rallies: one read "I disagree with you, but that doesn't mean I think you are Hitler." And finally, some were just nonsensical, such as one that stated, "Oooh . . . Shiny!"

Jon Stewart joked about the diversity of the crowd, saying facetiously that the participants were a "perfect cross-section of American society" and making up the percentages of each demographic. However, the crowd's diversity *was* striking. Attendees were young and old; there were many families (including mine) and people from all across the United States. I was also struck by the large number of women wearing headscarves in the Islamic tradition. The intolerance that has infected our political debate particularly affects those within Islamic and East Asian demographics. I imagine that for some of these attendees, the rally was about much more than light humor.

The use of humor to deliver political messages conveys much about how human brains work. Authors such as Antonio Damasio, George Lakoff, and Sam Harris have written excellent books that cover this subject. Increasing evidence indicates that the beliefs we espouse are developed through a complex interplay of knowledge, emotion, and logic. Many of our conscious beliefs originate in preconscious, emotional areas of the brain. The emotional brain, also called the *limbic system*, plays a surprising and critical role in allowing people to derive conclusions from knowledge that is often incomplete. The limbic system plays a primary role in helping us to rapidly evaluate potentially dangerous situations—by interfacing incomplete data to create a complete analysis—in almost every conclusion derived throughout our thought processes.

Photos courtesy of Jacqueline Wolozin

The ideas generated by the emotional brain are filtered through our logic centers to create the seemingly rational statements that we use in virtually every aspect of our lives. More knowledge, more security, or more training in logic elicits greater reason, while ignorance, fear, and appeal to "belief" elicits less reason. Our belief systems also filter acceptance of information. The emotional brain rejects facts that challenge our belief systems. One can immediately see how emotional appeals—such as those inciting fear, eliciting anger, or appealing to religious beliefs—could be used to lead us toward irrational political outcomes by activating the emotional brain to bypass more reasoned responses.

The importance of emotion in our actions, even seemingly rational ones, creates a challenge for "rational" political debate. Information that questions a belief system is difficult to incorporate because the "emotional" brain rejects such material. Knowledge, though, can filter in and affect our beliefs. Framing arguments in the context of childhood or family is a particularly effective means of conveying information, because family and children are emotionally vulnerable topics.

Humor is another effective mechanism used to convey knowledge that might challenge our belief systems. Knowledge or logic gained through humor elicits positive emotions, which make us feel less threatened and more accepting. The power of Jon Stewart's and Steven Colbert's messages lies in their skillful use of humor to question the many irrational beliefs and behaviors that pervade our society today. Thus, although the "Rally to Restore Sanity and/or Fear" was humorous, for many at the rally humor was the medium, but reason was the message. ■

Strange Problems in the Wegman Report

A computer scientist discusses the roles of plagiarism, conspiracies, anti-science memes, and intense beliefs in a global-warming denying report.

JOHN R. MASHEY

The high-profile "Wegman report" (Wegman et al. 2006) strongly criticized the steeply rising "hockey stick" temperature graph that was created by climate scientists Michael Mann, Raymond Bradley, and Malcolm Hughes and later used in the United Nations Intergovernmental Panel on Climate Change's Third Assessment (IPCC 2001).

John R. Mashey is a computer scientist whose career has extended from Bell Labs to the Silicon Valley. Many of the wide variety of scientists he has worked with have used software or hardware he helped create. For the past few years he has been studying climate science, anti-science, and energy issues.

The Wegman report was prepared by a team led by statistician Edward Wegman of George Mason University at the request of U.S. Representatives Joe Barton (Republican from Texas) and Ed Whitfield (Republican from Tennessee), both strong opponents of the scientific consensus about climate change.

The Wegman report, presented in 2006 at a hearing of a congressional subcommittee chaired by Whitfield, repeated numerous well-cataloged and long-debunked anti-science assertions, especially those claiming a conspiracy among climate scientists. Although rarely mentioned in peer-reviewed science publications, the report nevertheless immediately became a major source for climate anti-science articles, blogs, op-eds, and books. The report is also a key to Virginia Attorney General Ken Cuccinelli's attack on the University of Virginia and Michael Mann (Russell 2010). That certainly resembles a famous witch hunt (Monty Python 1975).

Discovery of Plagiarism

Canadian blogger "Deep Climate" uncovered plagiarism in the Wegman report in late 2009, accumulating ten pages of near-verbatim material copied from paleoclimatologist and hockey-stick coauthor Bradley and others, such as:

> A cross section of most temperate forest trees will show an alternation of lighter and darker bands, each of which is usually continuous around the tree circumference. (Bradley 1999, 398)
>
> A cross section of a temperate forest tree shows variation of lighter and darker bands that are usually continuous around the circumference of the tree. (Wegman et al. 2006, 13)

> The term "coral" is generally applied to members of the order Scleractinia, which have hard calcareous skeletons supporting softer tissues. . . . (Bradley 1999, 247)
>
> The term "coral" refers to the biological order *Scleractinia*, which have hard calcium-based skeletons supporting softer tissues. (Wegman et al. 2006, 15)

Deep Climate (2010a) posted the entire ten pages using colored highlighting that quickly shows the obvious cut-and-paste/edit process.

Based on Deep Climate's work, Bradley filed a plagiarism complaint in March 2010 but kept it quiet. Bradley's expert work was not only plagiarized

but also often distorted to weaken or even invert his own conclusions by people with zero relevant experience. I then extended Deep Climate's research and added much more in a comprehensive 250-page analysis of the Wegman report, "Strange Scholarship in the Wegman Report: A Façade for the Climate Anti-Science PR Campaign" (Mashey 2010b). *USA Today* (Vergano 2010a; Vergano 2010b; Vergano 2010c; Vergano 2010d) reported that George Mason University was investigating. Plagiarism experts called the plagiarisms "obvious" and "shocking." Some defenders created their own fanciful definitions of the word to deny that plagiarism had taken place. Others contended that even if it was plagiarism, the Wegman report's conclusions were still true. Then some claimed that Bradley himself was a plagiarizer, blackmailer, or liar. The debate remained intense.

Pseudoscience, Anti-Science, and Intense Beliefs

In pseudoscience, people promote long-debunked ideas as scientific (Mashey 2009). Anti-science obscures real science via the public-relations and propaganda techniques that were well honed in the tobacco wars and are sometimes employed by the same people elsewhere (Oreskes and Conway 2010).

SI readers are familiar with chaotic, amateur, or amusing pseudoscience efforts. Anti-science, in contrast, is well funded, professionally organized, and not amusing: tobacco-industry anti-science has damaged the health of millions. Although the Wegman report contained some pseudoscience, it was really part of a well-organized twenty-year anti-science campaign (Mashey 2010a). That campaign offered much evidence of a real conspiracy, in contrast to the climate-science opponents' unsupported claims alleging a conspiracy by climate researchers. Not all conspiracies are imaginary—SI readers should assess the evidence before dismissing conspiracy hypotheses.

Pseudoscience beliefs can be strong. Climate anti-science beliefs are intense enough to generate frequent death threats against climate scientists. My analysis documents the Wegman report as filled with serious errors, biases, bad science, and frequent repetition of long-debunked anti-science memes. Its minimal statistics use another's (incorrect) computer code (Deep Climate 2010b).

The Wegman report was promoted by Congressmen Barton and Whitfield as "independent, impartial, expert" work by a team of "eminent statisticians." It was none of those things. Deep Climate had unearthed plagiarism (not "expert") and distortion (not "impartial"), then found that a Barton staffer provided much of the source material to the Wegman team (not "independent"). In my initial investigation I found another twenty-five pages with plagiarism, totaling thirty-five when combined with Deep Climate's findings (Mashey 2010b). Originally intended to be a short report, my analysis grew to its current 250 pages as interconnected problems in the Wegman report multiplied. My analysis eventually examined all ninety-one Wegman report pages plus related testimony, publications, and actions. "Climategate" started big and shrank, despite strong public-relations efforts. The problems with the Wegman report started small with a few pages of plagiarism, but those problems have grown ever since. Yet Barton still stands behind the Wegman report.

Half of the report's eighty references were uncited in the text itself, a tactic called "bibliography padding" that is frequently used by undergraduates to create an illusion of expertise. Many references use "grey literature" (not peer-reviewed), including the key source ("MM05x") of many anti-science memes. "MM05x" quotes an article that appeared not in *Science* but in the *Journal of Scientific Exploration*, a favorite publication of pro-fringe-science researchers. It is filled with scholarly looking papers on extrasensory perception (ESP), UFOs, reincarnation, inexplicable weight gain in suffocated sheep, dog astrology, and other fascinating topics. Most of its articles are available online (Society for Scientific Exploration 2010). Occasionally proper skeptical debunking papers do slip into print there.

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The Wegman report also referenced a 1987 article, "Magnetics May Hold Key to Ozone Layer Problems" by Tom Valentine. Its inclusion is utterly bizarre, especially in a report criticizing the quality of review elsewhere. A 1987 ozone article was at best irrelevant bibliography padding. The publication in which Valentine's article appeared, *MAGNETS*

in Your Future, was an obscure fringe-science magazine. Valentine often wrote on fuelless engines, psychic surgery, and conspiracy theories for the tabloid the *National Tattler*. His bio stated that he was the "Miracle editor." Later his talk show often promoted "black helicopter" conspiracies. Nevertheless, some people remain unshakeably certain of the Wegman report's credibility.

A short article cannot convey the pervasiveness and strangeness of problems with the Wegman report. Skeptics should read my long report to assess the claims made here. I expect to update my online report (Mashey 2010b) in a few months and will be glad to be informed of any honest errors. ■

References

Bradley, Raymond S. 1999. *Paleoclimatology—Reconstructing Climates of the Quaternary,* Second Edition. San Diego, CA: Academic Press/Elsevier.

Deep Climate. 2010a. Wegman report update, part 1: More dubious scholarship in full colour. Available online at http://deepclimate.org/2010/07/29/wegman-report-update-part-1-more-dubious-scholarship-in-full-colour. (*Deep Climate has made many posts, but this reference is a good starting point.*)

———. 2010b. Replication and due diligence, Wegman style. Available online at http://deepclimate.org/2010/11/16/replication-and-due-diligence-wegman-style.

IPCC (Intergovernmental Panel on Climate Change). 2001. *Climate Change 2001: The Scientific Basis. Contribution of Working Group 1 to the Third IPCC Scientific Assessment*. Edited by J.T. Houghton, Y. Ding, D.J. Griggs, et al. Cambridge University Press. Available online at www.grida.no/climate/ipcc_tar/wg1/index.htm.

Society for Scientific Exploration. 2010. *Journal of Scientific Exploration* past research articles. Available online at http://www.scientificexploration.org/journal/articles.html.

Mashey, John R. 2009. Science bypass: Anti-science petition to APS from folks with SEPP, George C. Marshall Institute, Heartland, CATO. Available online at www.desmogblog.com/sites/beta.desmogblog.com/files/2009 science bypass v3 0.pdf.

———. 2010a. Crescendo to Climategate cacophony: Behind the 2006 Wegman report and two decades of climate anti-science. Available online at www.desmogblog.com/sites/beta.desmogblog.com/files/crescendo climategate cacophony v1 0.pdf.

———. 2010b. Strange scholarship in the Wegman report: A façade for the climate anti-science PR campaign. Available online at http://deepclimate.files.wordpress.com/2010/09/strange-scholarship-v1-02.pdf.

Monty Python. 1975. *Monty Python and the Holy Grail*. "Witch Scene" available online at www.youtube.com/watch?v=yp_l5ntikaU.

Oreskes, Naomi, and Erik Conway. 2010. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. New York: Bloomsbury Press.

Russell, Wesley. 2010. RE: Civil Investigative Demand No. 3-MM. Available online at http://voices.washingtonpost.com/virginiapolitics/New Mann CID.PDF.

Vergano, Dan. 2010a. University investigating prominent climate science critic. *USA Today* (October 8). Available online at http://content.usatoday.com/communities/sciencefair/post/2010/10/wegman-plagiarism-investigation-/1.

———. 2010b. Experts claim 2006 climate report plagiarized. *USA Today* (November 22). Available online at www.usatoday.com/weather/climate/globalwarming/2010-11-21-climate-report-questioned_N.htm.

———. 2010c. Climate science critic responds to allegations. *USA Today* (November 23). Available online at www.usatoday.com/weather/climate/globalwarming/2010-11-21-climate-report-questioned_N.htm.

———. 2010d. Wegman report round-up. *USA Today* (November 23). Available online at http://content.usatoday.com/communities/sciencefair/post/2010/11/wegman-report-round-up/1.

Wegman, Edward, David Scott, and Yasmin Said. 2006. Ad hoc committee report on the "hockey stick" global climate reconstruction. House Energy and Commerce Committee Republicans (July 14). Available online at http://republicans.energycommerce.house.gov/108/home/07142006_Wegman_Report.pdf.

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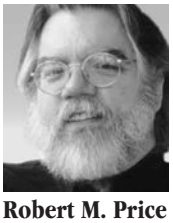
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Heaven's Stenographer: The 'Guided' Hand of Vassula Ryden

She claims to receive communications not only from her guardian angel, "Daniel," but also from Jesus and even Yahweh himself, who guide her hand to produce written messages. She has provoked both skepticism and credulity from Catholic laity and clergy, and her texts—an amalgam of Bible verses and Orthodox and Catholic teachings—have helped her attract an increasing following. Some claim to have witnessed supernatural experiences at her talks, although I did not when I witnessed her first appearance in Western New York in 2004. I have since sought to learn just who Vassula Ryden is and more about the phenomenon behind that name (Ryden 1995; "Vassula" 2010; Tokasz 2004).

Vassula

Born to Greek Orthodox parents in Heliopolis, Egypt, on January 18, 1942, Vassula Ryden emigrated to Europe when she was fifteen. She says as a teenager she saw herself surrounded by souls of the dead, although she claims to have been indifferent to religion for a time. Following marriage, the birth of two sons, divorce, and remarriage, she claims to have begun receiving messages from her own invisible "guardian angel," Daniel. "I almost freaked out," she said (Ryden 2004). That occurred in late 1985 while she was living in Bangladesh. Five years later, she "regularized" her marriage in the rites of the Greek Orthodox Church, to which she still belongs ("Vassula" 2010). Nevertheless, Ryden says that God revealed to her the Sacred Heart (a Catholic symbol of Christ's love for the human family) to show her the equality of all faiths (Ryden 2004).

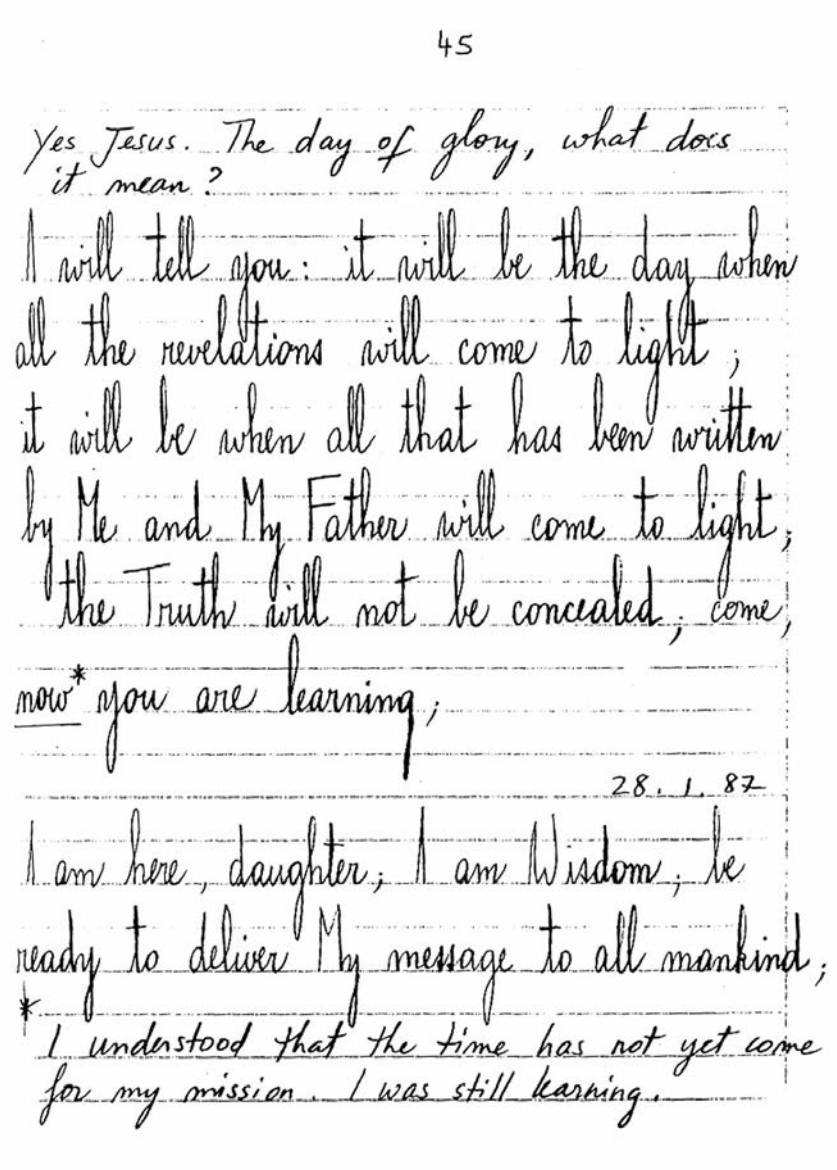
In the mid-1990s, the Vatican's Congregation for the Doctrine of the Faith issued two notices of concern about Ryden. The first came in 1995, pointing out "several negative elements and errors." It requested that bishops refuse to give her the opportunity to spread her questionable ideas within their dioceses and asked them not to treat her writings or speeches as "supernatural." The following year, another notification encouraged priests to "exercise serious spiritual discernment" regarding Ryden's messages, declaring that they must be considered merely "private meditations" and not divine revelations. However, some of her Catholic supporters observe that the church does not completely discount her teachings, and the publications of her organization, the American Association for True Life in God, have obvious Catholic trappings ("Vassula" 2010; Tokasz 2004).

The Catholic Church is skittish about such freelancers—urging caution toward supposedly supernatural phenomena (such as stigmata or weeping effigies) and any reputed visions or messages. The Church is all too aware of delusional persons and pious frauds. However, such matters are usually left to the local bishop, and investigations are typically less about science than about how a claim comports with Catholic teachings.

I determined to take an objective look at three aspects of Ryden's purported messages (within my own areas of expertise): first, the distinctive handwriting (I am author of textbooks on writing and forgery, including *Pen, Ink, and Evidence* [Nickell 1990]); second, the text (I have a PhD in English, experience in examining unusual texts, and membership in the International Association of Forensic Linguists) [Nickell 2008]; and third, whether Ryden might have a fantasy-prone personality (I have studied this trait for years, especially under the direction of the late psychologist Robert A. Baker [Nickell 1997]).

Handwriting

Ryden insists that the messages she receives and writes down are not the result of spiritualistic phenomena such as channeling or automatic writing ("Vassula" 2010). However, neither phenomenon is defined as being limited to spirits of the dead; either may involve interaction with any type of alleged nonphysical beings, such as angels,


45

Yes Jesus. The day of glory, what does it mean?

I will tell you: it will be the day when all the revelations will come to light; it will be when all that has been written by Me and My Father will come to light; the Truth will not be concealed; come, now* you are learning;

28.1.87

I am here, daughter; I am Wisdom; be ready to deliver My message to all mankind;

* I understood that the time has not yet come for my mission. I was still learning.

Figure 1. Handwriting produced by artist Vassula Ryden—supposedly "supernaturally guided"—is drawn rather than freely written. (The same mannered script is used for messages from "Yahweh," "Jesus," "Mary," and her guardian angel, "Daniel.") It contrasts with her own handwriting.

deities, extraterrestrials, or the like (Guiley 2000, 25–26, 70–71). So, Ryden is by definition a channeler and an automatic writer.

Reportedly, the messages began in late November 1985 when Ryden was about to make a shopping list. Her hand suddenly began to move, seemingly without her control, to form words and drawings, initiating a phenomenon that continues to the present day. The self-styled visionary reportedly receives about four to six hours of guided-hand "dictation" each day (Carroll 1995, ix; "Vassula" 2010). From a scientific perspective, (assuming it is not deliberately contrived) such a phenomenon is attributed to the ideomotor effect, in which a participant unconsciously produces a movement. The same psychological phenomenon is responsible for the motion of dowsing rods and pendulums, Ouija-board planchette movement, table tipping, and the like (Randi 1995, 169–70).

Ryden's messages supposedly "come through dictation by an audible voice within, then are written in a stately handwriting—distinct from her own—as she allows her hand to be guided supernaturally" ("About" 1995). Interestingly enough, the same "distinct" script that is used for messages from the angel "Daniel" is employed by "Jesus," "Mary," and "Yahweh" (see figure 1), rather than each entity having his or her own individual handwriting.

Keeping in mind that Ryden is an artist ("About" 1995), it seems noteworthy that the "guided" handwriting has the characteristics of a script that is artistically drawn rather than naturally and freely written. It is a "mannered" or affected hand, rendered in a self-consciously non-slanted style—rather like the so-called "vertical writing" that was taught in American and Canadian schools from 1890 to 1900 but was deemed too time consuming to produce practically and subsequently abandoned (Nickell 1990, 124, 126; Osborn 1978, 140). Most mainstream scripts, intended for right-handed persons to render with some speed, slope in the forward direction, as does Ryden's ordinary handwriting. Interestingly, an alteration in slant is one of the most common ploys used for disguising handwriting (Hilton 1982, 169; Osborn 1978, 147, 149, 211). Use of this simple change can thus instantly impart a new look to an entire page. The "stately" hand also differs from Ryden's in size (being larger than hers), another common disguise ploy (Nickell 1996, 49).

Apart from the "stately" affectation, the supposedly supernatural handwriting is essentially a formal, copybook version of Ryden's own naturally jotted script that alternates with the "stately" hand in her notebooks. The "stately" hand avoids some of her script's idiosyncrasies, yet it still has mostly printed capitals just like her own handwriting. On occasion, one of the copybook forms sneaks back into her natural script (replacing, for instance, her individualistic *f*, which has a backwardly made loop, with the standard copybook *f*) (see Ryden 1995, 171, 223).

Consistent with its neat, drawn appearance is the fact that the "guided"

handwriting is done on lined paper, with the lines showing in some of the reproduced pages (Ryden 1995, e.g., 232–33). This is consistent with the use of eye-hand coordination. One suspects that if Ryden were prevented from seeing what was being written, the entities supposedly guiding her hand would be unable to so faithfully follow the lines! I invite Ryden to accept my invitation to perform a scientific test to refute or confirm this suspicion.

One suspects that if Ryden were prevented from seeing what was being written, the entities supposedly guiding her hand would be unable to so faithfully follow the lines! I invite Ryden to accept my invitation to perform a scientific test to refute or confirm this suspicion.

Text

On January 25, 1987, Ryden wrote:

> Courage daughter, I, Jesus Christ have instructed you that the cross you bear is My Cross of Peace and Love, but to bear My precious Cross, daughter, you will have to do much self-sacrifice; be strong and bear my Cross with love; with Me you will share it and you will share My sufferings; I was pleased to hear your prayer of surrender; in surrendering to Me I will lift you to the heights and show you how I work; I will mould you, if you let Me, into a better person; you have given Me your consent to become My bride, so what [*sic*] more natural for a bride to follow her Spouse? I am glad you realize your worthlessness, do not fear, I love you anyway. . . . (Ryden 1995, 233–34)

Is this really a message from Jesus guiding Ryden's hand? Not only is the handwriting the identical, mannered script that is also used for her "Daniel," "Yahweh," and "Mary," but the perpetual use of semicolons is another similarity from alleged speaker to alleged speaker. All—except, appropriately, Daniel—call her "daughter" (Ryden 1995, 153, 188, 225), and they refer to themselves with the same construction: "I, Jesus," "I, God," "I 'i Panayia'" (Greek for "Our Lady, most Holy") (Ryden 1995, 155, 231, 293).

Ryden's purported messages can be compared with other alleged communications from Jesus. One set of writings was "received from Jesus" by Lilian Bernas (1999), a purported stigmatic. (*Stigmata* are the supposedly supernaturally received wounds resembling those of Christ. However, Bernas's wounds—which I have seen up close—appear to be consistent with self-infliction [Nickell 2007, 59–66].) In one communication with Bernas, Jesus supposedly said (Bernas 1999, 23):

> My Suffering Soul—
> This is your Beloved. I have come as promised to embrace you with the spirit of peace. Take this time, and have respite from the wicked assaults of the evil one. My child, you have bent, but you have not broken. This pleases your Beloved. . . .
>
> My child—humble yourself now, and ascend the hill of your Beloved with your Beloved. . . .

Nancy Fowler, a homemaker in Conyers, Georgia, claimed for several years to be receiving messages from both Jesus and, more often, the Virgin Mary. (The latter appeared punctually on the thirteenth of each month, and I was able to attend a session [Nickell 1993, 196–97]). One message from "Jesus" instructed the faithful (Fowler 1993):

> Come through My Mother on your journey back to Me. From this very cross I give the world My perfect love. I give the world, I give everyone in the world, My dear, Holy Mother. Please, if you accept My Love, then how can you reject, ignore, not honor, not love My Mother. I come through My Mother and I want you, dear children, to come through My Mother on your journey back to Me.
>
> I choose the word "Come" intentionally, not past tense. I still come through My Mother. Graces are poured forth through My Mother, the Graces come from Me.

I am especially familiar with these two groups of writings, although they are supposedly received by clairaudience (trance hearing) rather than by automatic writing. (Therefore, errors of grammar and the like could be attributed to mistaken transcription by the percipient.)

Now, whereas Vassula Ryden's "Jesus" frequently identifies himself as "I, Jesus," Lilian Bernas's Jesus persona never does, nor does the one channeled by Nancy Fowler. There are many other differences among the three sets of texts; for example, the dominant theme of each: Fowler's is the near-deification of the Virgin Mary (an emphasis sometimes disparagingly referred to as "Mariolatry"), Bernas's is the importance of suffering, and Ryden's is the need for divine love and guidance.

Style also differs from channeler to

If God deigns to use the English language, should we not expect it to be rendered accurately?

channeler. Ryden's "God" and "Jesus" (as well as "Daniel") speak similarly, often using convoluted diction (for example, "do not leave yourself be drifted away" [144], instead of "do not let yourself drift away"); wrong prepositions (e.g., "irrespective to their deeds" [146], rather than "irrespective of"); missing prepositions (such as in "I, Yahweh will remind them in this call many events" [150], wherein "of" is missing after "call"); subject/verb agreement error (e.g., "the reasons that makes" [44]); faulty auxiliary verbs (such as "I have restored you since the time you have accepted Me" [158], the second "have" being unnecessary); incorrect verb forms (e.g., "I will progress you" [163], "I fragranced you" [34], and "Jesus flourished you" [42]); and so on.

Ryden's messages also have occasional misspellings: for example, "God" says, "work with Me writting [*sic*] down My messages" (231), and he also uses the misspellings "joyfull" (138) and "analising" (101, 105). If God deigns to use the English language, should we not expect it to be rendered accurately?

Before we become invested in imagining what a deity might or might not do, we should note that Ryden's own written text has similar faults—for example, using "sprung" when "sprang" would be correct, the misspelling "panick," faulty subject/verb agreement (e.g., "Joy and Peace is"), and many others. At times the respective errors are eerily similar, as when "God" uses "do" for "make" (e.g., "do not get discouraged when you do errors") just as Ryden does (e.g., "I do so many mistakes") (see Ryden 1995, 22, 89, 93, 235).

Fantasy-Proneness

From the evidence, it looks like Ryden's channeled automatic writings are merely emanations from a single source: her imagination. Indeed, she exhibits many traits of what is known as a "fantasy-prone" personality: sane and normal but with a propensity to fantasize, as described in a pioneering study by Sheryl C. Wilson and Theodore X. Barber (1983). Since childhood, Ryden has had various "mystical" experiences. She has encountered apparitions (such as the souls of "dead people"), had vivid or "waking" dreams (with paranormal imagery), experienced religious visions, interacted with invisible companions, received messages from higher entities, and had other experiences common to many fantasizers (Carroll 1995; Ryden 1995, xx–xxl).

Taken together, the contrived handwriting, the linguistic lapses, and the indications of fantasizing all suggest that Vassula Ryden is not in touch with supernatural entities but is simply engaging in self-deception that in turn deceives the credulous. Her automatic writings therefore are not works of revelation but simply of pious imagination. ■

References

About Vassula Ryden. 1995. Publisher's book-cover text, Ryden 1995.

Bernas, Lilian. 1999. *This Is the Home of the Father*.... Poole, England: privately printed.

Carroll, Robert J. 1995. I am your guardian angel and my name is Daniel. In Ryden 1995, ix–xiv.

Christopher, Milbourne. 1970. *ESP, Seers and Psychics: What the Occult Really Is*. New York: Crowell.

Fowler, Nancy. 1990–93. *Purported messages from Jesus, in Journal 1993*. 3–8.

Guiley, Rosemary Ellen. 2000. *The Encyclopedia of Ghosts and Spirits*. New York: Checkmark Books.

Hilton, Ordway. 1982. *Scientific Examination of Questioned Documents*, revised ed. New York: Elsevier Science.

Journal of Reported Teachings and Messages of Our Lord and Our Living Mother at Conyers, Georgia, USA. 1993. ("Compiled by Our Loving Mother's Children," P.O. Box 309, Conyers, GA 30207), December.

Nickell, Joe. 1990. *Pen, Ink, and Evidence*. Reprinted New Castle, Delaware: Oak Knoll Press.

———. 1993. *Looking for a Miracle*. Buffalo, NY: Prometheus Books.

———. 1996. *Detecting Forgery: Forensic Investigation of Documents*. Lexington, KY: University Press of Kentucky.

———. 1997. A study of fantasy proneness in the thirteen cases of alleged encounters in John Mack's abduction. In *The UFO Invasion*, edited by Kendrick Frazier, Barry Karr, and Joe Nickell. Amherst, NY: Prometheus Books, 237–44.

———. 2007. *Adventures in Paranormal Investigation*. Lexington, KY: University Press of Kentucky.

———. 2008. Linguist. Accessed April 3, 2010. Available online at www.joenickell.com/Linguist/linguist1.html.

Osborn, Albert S. 1978. *Questioned Documents*, second edition. Montclair, NJ: Patterson Smith.

Randi, James. 1995. *The Supernatural A–Z*. London: Brockhampton Press.

Ryden, Vassula. 1995. *My Angel Daniel*. Independence, MO: Trinitas.

———. 2004. Lecture at St. John Maronite Rite Catholic Church. Amherst, NY, May 31.

Tokasz, Jay. 2004. Controversial "messenger" to speak. *The Buffalo News*, May 31.

"Vassula Ryden." 2010. *Wikipedia*. Accessed April 30, 2010. Available online at http://en.wikipedia.org/wiki/Vassula_Ryden.

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Magic or Miracle?

A Lesson Worth Remembering

Fourteen years ago, I was astonished to read a brief article in the January 1997 (vol. 61, no. 846) *Journal of the Society for Psychical Research* (*JSPR*) written by parapsychologist Alexander Imich, a retired chemist and president of the Anomalous Phenomena Research Center in New York. His article, titled "Joe A. Nuzum, A Little-Known Psychic," describes Nuzum as being "of the D.D. Home[1] class." The article consisted of a long list of miracles that Nuzum appeared to have performed over the years. However, my astonishment was due not to the impressiveness of the list but rather to the following facts: 1) the conditions under which these presumed miracles took place were not described in the article; 2) all of the "phenomena" described belonged to the classic conjurers' and fakirs' repertoire; 3) it appeared that no magician was ever present at any of Nuzum's demonstrations; and 4) there was no reference to the fact that Nuzum himself was a magician.

Banachek and Project Alpha

Today Nuzum, though still claiming on his website to have "mastered many mind-over-matter studies," runs a magic shop in Pennsylvania. I contacted mentalist and friend Banachek who, under his real name of Steve Shaw, was one of the celebrated alumni of Project Alpha (in which young magicians fooled scientists into thinking they had extrasensory perception [ESP]). Steve confirmed to me that he was a friend of Nuzum at the time of Project Alpha. They lived in the same town, had been friends for at least five years, and used to exchange tricks and ideas on magic. However, it appears that Nuzum—who had specialized in escapology at the time—was impressed by the press coverage that Steve had been able to gather while pretending to be a psychic, and he wanted to achieve the same result.

Steve "Banachek" Shaw

the Skeptical Inquirer
Randi's Project Alpha:
Magicians in the Psi Lab
American Disingenuous: Cult Archaeology
Responding to Pseudoscience
Bogus UFO Film / AAAS and Psi
Martin Gardner's 'Notes of a Psi-Watcher'
VOL. VII NO. 4 SUMMER 1983
Published by the Committee for the Scientific Investigation of Claims of the Paranormal

Project Alpha magicians Steve Shaw (with fork), Michael Edwards, and James Randi were featured on the cover of the Summer 1983 SI.

Nuzum started to perform mentalism tricks, most of which were pretty standard purchased items, and with these he convinced psychiatrist Berthold Schwartz that he was the real thing.

Schwartz had already been "amazed" by Steve during Project Alpha, and he continued to believe that Steve really had psychic powers even after the hoax was revealed. When Steve tried to explain to him via letters that Nuzum was a colleague and was just performing conjuring tricks, Schwartz refused to listen.

Steve told me:

> There is a big difference between what Joe Nuzum is doing and what I did. My fiasco was an experiment. For years parapsychologists had lamented that the only reason there was no scientifically documented evidence under proper scientific controls was because of the lack of proper funding to perform such controls. We had countered and believed that this was not the case and the lack of such docu-

"In retrospect I should have known that Joe [Nuzum] would have had no problem using people for his own benefit."
—Steve Shaw

mentation lay in the parapsychologists' pro-biased beliefs when they entered such experiments. MacDonald Douglass gave a half a million dollars to study . . . Psychokinetic Metal Bending, PKMB, to Washington University. Here was our chance to prove our point.

I went in not to take advantage, not to gain anything, not to take money, trips and vacations (unlike Joe), but simply to prove a valid point. I went in knowing full well that I was going to expose the fraud I was perpetrating. It became very hard at times. These were good people, with good hearts, who became my friends. It was very hard knowing I was going to have to hurt these people who had become a personal part of my life. Had I known they would mean so much to me, maybe I would have done things a little different, I certainly would have kept my distance emotionally.

On the other hand, I should have read the signs in Joe Nuzum. I should have known that he certainly would not have cared about hurting other people or lying to them; in retrospect I should have known that Joe would have had no problem using people for his own benefit.

Project Alpha was designed to show how competent magicians can complete the same tasks as self-proclaimed psychics. It appears, however, that some experts still don't believe the phenomena aren't genuine.

A "Challenge" Met

Because my comments (along with those of James Randi) were published in the *Journal of the Society for Psychical Research*, Imich decided to give us a reply (*JSPR* 61[848], July 1997). However, his words regarding our doubts, I regret to say, were quite disappointing. As usually happens in such cases, our real question was avoided.

As Randi and I had pointed out in our letters, the fact that the effects presented by Nuzum looked as if they were taken directly from a magic catalog should have raised flags. We did not insist, as Imich implied, that Nuzum's effects were *necessarily* done by trickery. But they at least *may* have been done in such a way. What is the real question, then? Given the highly suspect nature of Nuzum's demonstrations, it was for Imich of the utmost importance to ascertain that they were not the result of trickery. The only way to do this was to ask a competent magician to participate in the tests. Randi, Steve, or I would have loved to attend such demonstrations, but the suggestion was ignored.

Surprisingly, however, Imich wrote:

> The crusaders against the paranormal usually do not tackle difficult cases. They prefer to deal with events easier to criticize. Mr. Randi, too, does not mention the "*Gray's Anatomy* case," an event out of the range of magical technique and much more difficult to discredit. I have challenged Mr. Polidoro to repeat this event, but I am not sure if he himself is a magician.

Aside from the fact that this was the first time I had heard of such a "challenge" (and the fact that Imich did not appear to have any qualification to judge whether an event is "out of the range of magical technique" or not), what most surprised me about this accusation was that in my letter I suggested a possible explanation for just one of the effects described by Imich, the "*Gray's Anatomy* case"!

I wrote, in fact:

> Mr Imich, for example, describes an effect by Nuzum he witnessed, in which the corner of a selected page of a book appeared inside an envelope. A simple suggestion: Mr Imich could invite Nuzum to perform the same phenomenon again, but asking him, this time, never to touch the book (not even to take it [off] of the shelf). It would be interesting to see if the same phenomenon will manifest again (provided, of course, that both book and page are chosen at random by the experimenter, and not "suggested" by Nuzum . . .).

Apparently Imich overlooked these lines in my letter.

Remembering this episode today, however, gives me the chance to also stress once more that it is not the duty of the critic to reproduce a claimed miracle. As should be widely known by now (but is apparently not to many researchers), the burden of proof always rests on the claimant. In this particular case, I would have considered it quite impressive if Nuzum could perform his miracle with a book provided by me. I would have made sure not to let him get anywhere near the book before the test, a precaution that Imich did not take. Quoting from his notes (*JSPR*, 61[846]: 336): "*He took* from my book-shelf a volume of *Gray's Anatomy* and *[he] opened it* at page 354" (emphasis added).

In a postscript to his article, Imich added that a report about "the latest, never-previously-described paranormal events produced by Joe Nuzum" was in preparation. Fourteen years later, some are still waiting for some reliable proof of at least one real phenomenon produced by this self-proclaimed psychic. However, we stopped holding our breaths a long time ago. ■

Note

1. Victorian British medium Daniel D. Home, sometimes referred to as a super-psychic, was supposedly capable of moving objects, levitating, and producing all manner of supernatural phenomena at will.

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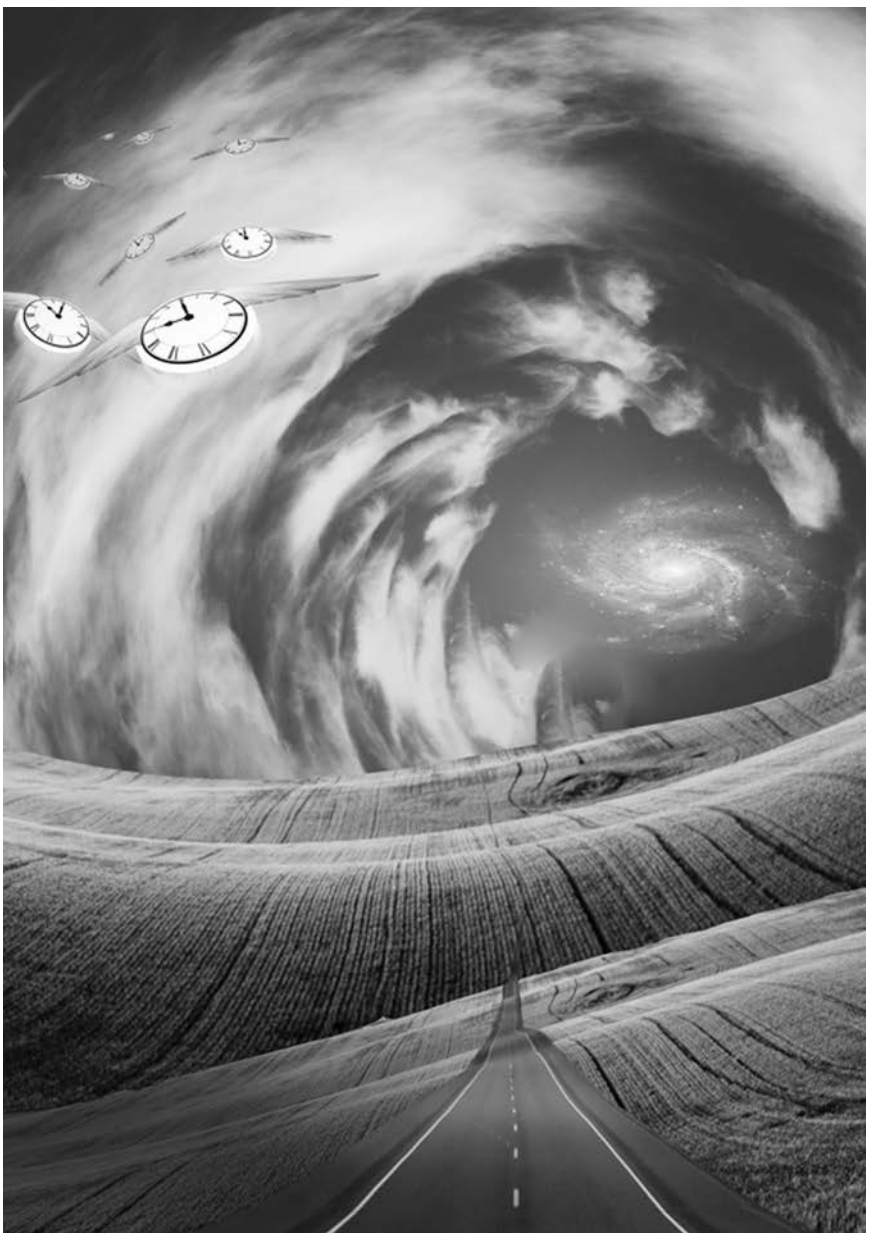
On Time Travel

> The thing is, time travel is like visiting Paris. You can't just read the guidebook. You've got to throw yourself in. Eat the food, use the wrong verbs, get charged double, and end up kissing complete strangers. Or is that just me?
>
> —Dr. Who, in the episode "The Long Game" (2005)



A few days ago I received the new editorial schedule for the SKEPTICAL INQUIRER from the editor of this magazine, Ken Frazier. There was a peculiarity concerning when my next column was due: three days before I received the e-mail! I checked with Ken, and there was no error. Because of a new approach to scheduling, my next column really was due in the past—though I was told I would get a reprieve of about two weeks. Coincidentally, at the time I was also reading an introductory book on metaphysics—which included a discussion of time traveling—as well as watching some episodes of the BBC series *Dr. Who*, which is all about time travel (and no, I wasn't watching the series while reading the book and the e-mail; my ability to multitask doesn't extend that far). So, the idea of doing a column about time traveling sprang naturally to mind.

To begin with, we need to make a distinction between the physical possibility of time travel and the logic of it. Broadly speaking, the first item is a matter for physics, the second for philosophy (though obviously the two

The problem with causal loops is that one gets the nasty suspicion that something is being gotten out of nothing: Where does the know-how to build time machines ultimately come from?

would intersect if we ever did try to get a time machine working). In this column I will focus on the conceptual issues posed by time travel. There are two such issues that are particularly pressing: first off, time travel seems to necessitate backward causation; second, it seems to make causal loops possible. And both backward causation and causal loops are problematic ideas.

Philosopher David Lewis gives a simple example of backward causation: Suppose you see a wannabe time traveler about to step into his machine, and you manage (for whatever reason!) to punch him in the face. He then escapes to his machine, sets it for five hundred years in the past, and reappears during the Renaissance. In the meantime, his physiological reaction to the punch has continued, so a bruise will form on his face—which means that you are responsible for a bruise appearing five centuries before you actually punched the guy. That's backward causation.

The first thought that comes to mind is that backward causation is an oxymoron: surely by definition the effect cannot precede the cause! But the tricky part of that statement is the word *precede*. If by "the effect cannot precede the cause" we mean that the effect cannot causally precede its cause, the statement is indeed true. If the effect did causally precede the cause, we would simply call the effect a "cause" and the cause an "effect," and logical order would be restored. But *precede* may mean temporally, not causally, prior. Most theories of causation (of which there is a long tradition, stretching back to Aristotle) are in fact compatible with backward causation, as long as the effect precedes the cause *temporally* but not *causally*—the example of the time traveler who is punched in the face is one that does not entail any logical contradiction.

What about causal loops? Brian Garrett gives us an example in his book *What Is This Thing Called Metaphysics?* Imagine that a time traveler goes back to his own youth to tell his younger self how to make a time machine. The young inventor then makes it possible—by building the machine—for his older self to come back from the future and instruct him on how to build it. You see that there is a closed causal chain at work here. The problem with causal loops is that one gets the nasty suspicion that something is being gotten out of nothing: Where does the know-how to build time machines ultimately come from? Clearly, it comes neither from the older nor from the younger "inventor." Whence then?

Garrett himself doesn't seem too bothered by this problem. He says that we have no trouble conceiving of all sorts of uncaused events, so why should this particular one be problematic? But his examples of non-troubling uncaused events just don't seem to fit the bill: "God, or the Big Bang, or the entire infinite past of the universe, or the decay of a tritium atom." Let's exclude God, because I don't think that ill-defined concept belongs in any serious philosophical discussion of science. The other events are hardly cases analogous to the building of a time machine, both because they pertain to quantum-level phenomena (and you know how poorly we understand those!) and because it is not at all a given that the big bang or atomic decay are truly uncaused events.

No essay about time travel could possibly be complete without a mention of the grandfather paradox. It seems that if time travel is possible, then it should also be possible to go back and kill your grandfather before your father is born (why you might want to do that is an entirely different question, of course). But killing your grandfather puts you in yet another causal loop: if you do manage to kill him, then how could you have been born in the first place, which is a necessary precondition for you to go back in time and kill him? The general conclusion seems to be that time travel requires causal loops, which in turn necessitate closed time-like curves. For all we know at the moment (from physics, particularly relativity theory), however, time is a linear dimension like the three spatial ones, not a closed curve—unless some particularly strange version of string theory entailing folded time dimensions manages to turn up. But that's a whole different story (see my "Is Physics Turning into Philosophy?" SI, May/June 2006). ■

[SCIENCE WATCH KENNETH W. KRAUSE

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Religion on Politics on Science: The Rough Ride for Stem Cells Continues

On August 23, 2010, U.S. District Judge Royce Lamberth turned the recently revitalized world of stem-cell research on its unsuspecting ear. The decision centered on the Dickey-Wicker amendment, which bans federal financing of any research involving the destruction or endangerment of human embryos. According to Lamberth, the government violated that law when it acted upon President Obama's 2009 executive order expanding support for research on human embryonic stem cells (hESC). Dickey-Wicker first passed in 1996 and has been reattached to congressional spending bills every year since.

Sherley v. Sebelius was initiated by various claimants, including a number of Christian groups who were later dismissed for lack of standing. The remaining plaintiffs, adult stem-cell (ASC) researchers James Sherley and Theresa Deisher, were recruited to the suit and continue to claim standing based on alleged harm to their careers resulting from increased competition for federal cash.

Lamberth's preliminary injunction on funding had an immediate and major impact on the science community. The National Institutes of Health (NIH) was forced to abandon its review of fifty new grant applications. It also halted second-level review of twelve applications worth fifteen to twenty million dollars.

Although funding was restored on September 9 when the appeals court temporarily stayed Lamberth's injunction, many experts warn that mounting uncertainty has already caused irreparable damage and say American postdoctoral researchers are rethinking entry into the field. They also tell us that foreign graduates are more reluctant to consider positions in the United States.

The appeals court heard oral arguments on December 6 and was expected to rule sometime in January. The outcome is anything but certain, and many legal experts expect the case to reach the U.S. Supreme Court. Regardless, the legal fracas serves more constructively to highlight weightier and even more contentious questions.

First, the science: Just how important is continued research on hESC, and to what extent do recent advances in ASC and induced pluripotent stem-cell (iPSC) technologies alter that discussion?

Nothing obscures or distorts science quite like politics inspired by religion. According to celebrated skeptic Susan Jacoby (2011), "The problem with the good news that embryonic stem cell research will now go forward is that the public relations campaign against right-wing religious restrictions . . . [has] oversold the possibility of immediate practical results to conquer such diseases as Alzheimer's and Parkinson's."

Indeed, only three clinical trials involving hESC had received U.S. government approval as of this writing, and all were the product of privately funded research. In January 2009, Geron obtained permission to begin stem-cell therapy on patients with spinal-cord injuries. Then, in November 2010 and January 2011, respectively, Advanced Cell Technology got the Food and Drug Administration's go-ahead to work on juveniles with Stargardt's macular degeneration and adults with age-related macular degeneration. None of these trials, however, has produced any reportable results.

Research on ASC, by contrast, has already paid sumptuous dividends—including *bona fide* cures for certain blood diseases. Although ASC by themselves lack pluripotency, a barrage of recent headlines has flaunted this field's undeniable vitality.

In 2009, for example, Dr. Tracy Grikscheit from Children's Hospital Los Angeles opened up a pig and constructed a small intestine-like structure inside using nothing more than the animal's intestinal stem cells and a biodegradable cylinder-shaped scaffolding, thus demonstrating that ASC somehow "know" what to do when seeded onto a familiar structure (Sala et al. 2009). Preliminary tests suggest that Grikscheit's artificial bowel will function naturally in pigs.

A similar technique has improved the life of a human child. Again combining a synthetic scaffolding with stem

cells harvested from his young spina bifida-inflicted patient, Dr. Anthony Atala, director of the Wake Forest Institute for Regenerative Medicine, created a new bladder that, once attached to the old paralyzed organ, attracted its own nerve and blood supplies. Now, several years after surgery, the twenty-year-old patient's bladder performs normally.

But in recent months, iPSC have received more attention and generated more excitement among scientists than any other stem-cell technology. Back in 2006, Shinya Yamanaka was the first to successfully reprogram adult fibroblasts back to a pluripotent, embryonic-like state through the forced expression of four transcription factors (*SOX2*, *KLF4*, *MYC*, and *OCT4*). Just a few years later, staggering progress has been made in differentiating human iPSC into neurons and heart, liver, pancreas, and eye tissues. Now, say many experts, it appears that iPSC are "poised to have a major impact in biology and medicine" through applications in "disease modeling, drug screening, and, perhaps, cell-based therapies" (Sadelain 2010).

Indeed, on December 12, 2010, researchers from the Cincinnati Children's Hospital Medical Center in Ohio reported success in coaxing human iPSC (and separately cultured hESC) to form a three-dimensional organ resembling an intestine and to recapitulate smooth-muscle tissue, nutrient-absorbing cells, and mucous-, hormone-, and enzyme-secreting cells (Spence et al. 2010). Scientists have also used iPSC to cure diabetes in mice.[1]

Nevertheless, iPSC have presented their own problems. First, the insertion of external genes into reprogrammed cells can cause any number of expression anomalies. Second, one of Yamanaka's transcription factors is known to cause tumors. Third, the reprogramming process can be inefficient, resulting in only one success for every 1,000 cells treated. Indeed, one 2010 study reported that iPSC were thousands of times less likely to proliferate and suffered greatly increased rates of early senescence (aging) and apoptosis (cell death) when compared with their embryonic counterparts (Feng et al. 2010).

Emerging evidence also indicates that iPSC tend to retain traits from their tissue of origin—striking residual DNA methylation signatures that could seriously compromise their suitability for use in the fields of genetic engineering and regenerative medicine. In one of three new studies describing this phenomenon, now dubbed *epigenetic memory*, researchers compared iPSC reprogrammed through the Yamanaka method with mouse ESC generated via somatic-cell nuclear transfer (Kim et al. 2010). Disappointingly, they discovered that the iPSC were less likely to achieve "ground state pluripotency" and that they tended to differentiate into their original cell types.

Then again, scientists have addressed—and in some cases, overcome—these obstacles almost as quickly as journalists can write about them. Some labs now use viruses that don't invade the cell's genome, while others employ tiny rings of DNA called *episomes* that don't replicate when the cell divides.

This past September, Derrick Rossi of the Harvard Medical School used synthetic RNA molecules corresponding to the standard Yamanaka factors to produce RNA-induced pluripotent stem cells, or "RiPS," one hundred times more efficiently (a two percent success rate) than with viral methods and in roughly half the time (two weeks) (Warren et al. 2010). And because RNA disintegrates rapidly, RiPS are genetically identical to their source cells. Unfortunately, Rossi's process is exceptionally expensive and time consuming.

Even more recently, Sheng Ding, a chemist at the Scripps Research Institute in San Diego, effectively reprogrammed human skin cells by treating them with drugs and only one virus-delivered gene, *OCT4* (Zhu et al. 2010). And because that gene, too, has been replaced in experiments on mice, says Ding, a human protocol entirely free of foreign genes may not be far off.

The direct conversion of ordinary body cells has lately gained momentum as well. On November 7, Mickie Bhatia at McMaster University reported the first-ever conversion of human skin cells into red, white, and platelet blood cells using an *OCT4*-infused virus and a brew of immune-system stimulating proteins called *cytokines* (Szabo et al. 2010). Because these cells never pass through an embryonic-like state, the risk of tumor formation is averted. On the downside, converted cells will not easily multiply in the lab.

Regardless, America's most prominent and accomplished researchers continue to insist that neither ASC nor iPSC technologies have advanced far enough to render aggressive hESC research superfluous, let alone obsolete. During a well-publicized hearing on stem-cell research held on September 16, 2010, a Senate appropriations subcommittee took testimony from Francis Collins, director of the NIH, and George Daley, director of the Stem Cell Transplantation Program at the Children's Hospital Boston.

A vocal evangelical Christian as well, Collins made it plain during the hearing that hESC "remain the gold standard for pluripotency" and that "to prohibit work on [them] will thus do severe collateral damage to the new and exciting research on [iPSC]." He then reminded the senators that the NIH spends nearly three times as much on ASC research as it does on hESC research every year.

But Collins's most poignant testimony divulged how hESC are currently "providing key tools to help us study the origins of many devastating diseases that afflict babies and young children," including fragile X and Rett syndromes, developmental disorders of the brain. Americans "must persevere and move this research forward in a strong and consistent manner," he urged. The politics of delay and uncertainty, he warned, were tantamount to "pouring sand into the engine of discovery."

Having co-authored Rossi's groundbreaking RiPS paper, Daley's adamant avowal that iPSC "do not obviate the need for [hESC]" may have been

equally effective. He also noted the stubborn limitations of even the most successful ASC treatments involving the transplantation of hematopoietic cells. Despite fifty years of this research and practice, Daley said, "patients still die or become severely disabled because the transplant regimens are so toxic."

Clearly irritated by the current legal intrusion into scientific matters, Daley likened the political debate concerning different classes of stem cells to a contest between entertainers on *American Idol*. These arguments, he scolded, "are not based on sound scientific evidence, but rather ideologically driven attempts" to control science and distort sober medical realities. Urging new legislation to encourage American research, Daley was "convinced that [hESC] are critical to a multifaceted portfolio of NIH stem cell research."

Senate subcommittees are notorious for choosing witnesses certain to confirm member predilections. But these researchers' credentials, and those of their many professional supporters, cannot be denied. In the end, Jacoby (2011, 98) concurs: "That treatments may be a generation or two . . . away is not an argument against basic scientific research. The difficulty of the science makes it more, not less, important for researchers to move full speed ahead now in all areas that offer promise for the alleviation of the most serious age related diseases."

After the judiciary imposes itself, however, it quickly loses the option to bow out gracefully. Dickey-Wicker was a legal accident waiting to happen. But from the wreckage we must now address the next unavoidable question: How should Americans dispose of the stem-cell quandary—through the courts or through Congress?

In the courts, the defense will argue that Dickey-Wicker preceded and thus could not have been intended to control modern hESC research. It will contend that mere research on stem cells previously derived from embryos does not constitute harming those embryos, which is apparently the reasoning Congress relied upon during the past two presidential administrations.

A vocal evangelical Christian, Francis Collins made it plain during the hearing that hESC "remain the gold standard for pluripotency" and that "to prohibit work on [them] will thus do severe collateral damage to the new and exciting research on [iPSC]."

But even the best-case judicial solution would be inadequate. With polls showing continued and increasing popular support for hESC research, all science-friendly members of Congress should promptly push for clear and comprehensive legislation that would override Dickey-Wicker and codify many of the research guidelines announced by Obama in 2009.

And we shouldn't forget that the stem-cell question is part of a larger issue looming on the cultural horizon. America stands at a crossroads. Will it remain a nation committed to scientific innovation and economic progress? Or will ideology finally tear down those long-partnered academic and entrepreneurial edifices that generations of supremely talented, energetic, forward-thinking, and, yes, conscientious persons have worked so hard to erect? ■

Note

1. Also on December 12, researchers at Georgetown University Medical Center presented findings at the fiftieth annual meeting of the American Society of Cell Biology that insulin-secreting beta islet cells, normally found in the pancreas, can be produced from human spermatogonial ASC without the use of extra genes. These researchers hope that continued progress in this area will lead to a novel solution to juvenile-onset (type 1) diabetes.

References

Feng, Q., S. Lu, I. Klimanskaya, et al. 2010. Hemangioblastic derivatives from human induced pluripotent stem cells exhibit limited expansion and early senescence. *Stem Cells* 28: 704–12.

Jacoby, S. 2011. *Never Say Die: The Myth and Marketing of the New Old Age*. New York: Pantheon Books.

Kim, K., A. Doi, B. Wen, et al. 2010. Epigenetic memory in induced pluripotent stem cells. *Nature* 467(7313): 285–90.

Sadelain, M. 2010. The need for genetically engineered therapeutic pluripotent stem cells (Editorial). *Molecular Therapy* 18(2): 2039.

Sala, F.G., S.M. Kunisaki, E.R. Ochoa, et al. 2009. Tissue-engineered small intestine and stomach form from autologous tissue in a preclinical large animal model. *Journal of Surgical Research* 156(2): 205–12.

Spence, J.R., C.N. Mayhew, S.A. Rankin, et al. 2010. Direct differentiation of human induced pluripotent stem cells into intestinal tissue *in vitro*. *Nature* (advance online publication). doi: 10.1038/nature09691.

Szabo, E., S. Rampalli, R.M. Risueño, et al. 2010. Direct conversion of human fibroblasts to multilineage blood progenitors. *Nature* (advance online publication). doi: 10.1038/nature09591.

Warren, L., P.D. Manos, T. Ahfeldt, et al. 2010. Highly efficient reprogramming to pluripotency and directed differentiation of human cells with synthetic modified mRNA. *Cell Stem Cell* 7(5): 618–30.

Zhu, S., W. Li, H. Zhou, et al. 2010. Reprogramming of human primary somatic cells by *OCT4* and chemical compounds. *Cell Stem Cell* 7(6), 651–55.

[SKEPTICAL INQUIREE BENJAMIN RADFORD

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The Mysterious Morgellons Malady

Q: A recent evening television news show aired a report on people with mysterious—supposedly nonbiological—filaments growing out of their bodies. What's behind this claim?

—D. Phillips

A: People who suffer from Morgellons disease experience a variety of symptoms, including crawling or stinging sensations on the skin, chronic fatigue, and memory loss. Many also claim to find mysterious fiber-like materials extruding through their skin: "Fibers are reported in and on skin lesions and are usually white, but clinicians also report seeing blue, green, red, and black fibers that fluoresce when viewed under ultraviolet light" (Paquette 2007). A very new disease, its cause, mode of transmission, and treatment remain unknown.

Most doctors believe that Morgellons is a type of psychiatric disorder called *delusional parasitosis*, in which patients come to believe that they are infested with invisible insects or bugs (an excellent cinematic example of this disorder can be seen in the 2006 thriller *Bug*).

There's a strong link between Morgellons and mental illness. As researcher Mary Paquette noted in *Perspectives in Psychiatric Care* (2007), "over half of all individuals with Morgellons disease also suffer from mood disorders such as depression and bipolar disorder. It is estimated that 65% of children with Morgellons have some form of psychiatric illness such as attention deficit/hyperactivity disorder, oppositional defiant disorder, mood disorders, or autism." Such patients are often treated with antipsychotic drugs such as pimozide (Orap), olanzapine (Zyprexa), or risperidone (Risperdal) (Shenefelt 2010). An element of paranoia has also arisen surrounding Morgellons: sufferers sometimes claim that the U.S. government or the medical establishment knows what is causing their symptoms but is covering it up for some reason.

Sociologist Robert Bartholomew believes that Morgellons is a socially transmitted disease caused by a woman named Mary Leitao:

> In 2002, a South Carolina mother named Mary Leitao founded a website called the Morgellons [Research] Foundation, dedicated to solving the mystery of the ailment by the same name. Leitao became worried after strange symptoms developed in her two-year-old son. She chose the name after stumbling across a 1674 medical report describing similar symptoms to what he was experiencing. The site quickly became a magnet for people around the world with all sorts of vague symptoms. The pattern of transmission is not tied to a mysterious new bacteria or virus. In this instance, the Internet is the carrier—and the disease is an idea, which is spread by human insecurity and fear. It is a sign of our changing times, a product of the Information Age. (Bartholomew 2010)

Due largely to lobbying efforts by Leitao and others (including musician Joni Mitchell) associated with the Morgellons Research Foundation, the U.S. Centers for Disease Control and Prevention recently began investigating the disease, and there are a handful of experts who endorse Morgellons as a disease distinct from delusional parasitosis. Indeed, "At least one scientist—albeit not an expert in the field—is taking it seriously. 'Morgellons patients have masses of dark fibers visible at ×60 magnification under the unbroken skin, while unaffected individuals do not,' says Randy Wymore, assistant professor of pharmacology at Oklahoma State University. 'That took away any possibility that this was not a real thing'" (Marris 2006). Other researchers have concluded that the fibers come from mundane sources such as clothing, carpeting, or pets. Perhaps Wymore and other researchers will find good evidence of a real disease, but until then, the Occam's razor principle suggests that Morgellons is a mental disorder. ■

References

Bartholomew, Robert. 2010. Personal communication.

Marris, Emma. 2006. Mysterious 'Morgellons disease' prompts US investigation. *Nature Medicine* 12(9): 982.

Paquette, Mary. 2007. Morgellons: Disease or delusions? *Perspectives in Psychiatric Care* 43(2): 67–68.

Shenefelt, Philip. 2010. Management of psychodermatologic disorders. *Dermatology Nursing* 22(4): 9–17.

Back from the Future: Parapsychology and the Bem Affair

Psychologist Daryl Bem has reported data suggesting that individuals' future experiences can influence their responses in the present. Careful scrutiny of his report reveals serious flaws in procedure and analysis, rendering this interpretation untenable.

JAMES E. ALCOCK

A flurry of media attention is being directed toward the prepublication distribution of Daryl Bem's forthcoming research paper "Feeling the Future: Experimental Evidence for Anomalous Retroactive Influences on Cognition and Affect."[1] Bem claims to have found evidence of marvelous psychic abilities that transcend time and allow the future to reach backward to change the past. Both the academic stature of its author, a respected emeritus professor of psychology at Cornell University, and the fact that it was to be published in the American Psychological Association's (APA) *Journal of Personality and Social Psychology* have made this report particularly newsworthy.

Parapsychology has long struggled, unsuccessfully, for acceptance in the halls of science. Could this article be its breakthrough? After all, the article apparently provides evidence compelling enough to persuade the editors of the world's preeminent social-psychology journal of its worthiness. However, this is hardly the first time that there has been media excitement about new "scientific" evidence of the paranormal. Over the past eighty-odd years, this drama has played out a number of times, and each time parapsychologists ultimately failed to persuade the scientific world that parapsychological phenomena (psi) actually exist. Recalling George Santayana's now-clichéd dictum, "Those who cannot remember the past are condemned to repeat it," we should approach Bem's work using a historical framework to guide us. Consider the following:

1. In 1934, Joseph Banks Rhine published *Extra-Sensory Perception* (Rhine & McDougall, 1934/2003), summarizing his careful efforts to bring parapsychology into the laboratory through application of modern psychological methodology and statistical analysis. Based on a long series of card-guessing experiments, Rhine wrote: "It is independently established on the basis of this work alone that Extra-Sensory Perception is an actual and demonstrable occurrence" (p. 210). Elsewhere, he wrote: "We have, then, for physical science, a challenging need for the discovery of the energy mode involved. Some type of energy is inferable and none is known to be acceptable . . ." (166).

Despite Rhine's confidence that he had established the reality of extrasensory perception, he had not done so. Methodological problems with his experiments eventually came to light, and as a result parapsychologists no longer run card-guessing studies and rarely even refer to Rhine's work.

2. Physicist Helmut Schmidt conducted numerous studies throughout the 1970s and '80s that putatively demonstrated that humans (and animals) could paranormally influence and/or predict the output of random event generators. Some of his claims were truly extraordinary: for example, that a cat in a garden shed, which was heated only by a lamp controlled by a random event generator, was able—through psychokinetic manipulation—to turn the lamp on more often than would be expected by chance. Schmidt's claim to have put psi on a solid scientific footing garnered considerable attention, and his published research reported very impressive p values.[2] In my own extensive review of his work, I concluded that Schmidt had indeed accumulated impressive evidence that something other than chance was involved (Alcock 1988). However, I found serious methodological errors throughout his

Excitement about Helmut Schmidt's research gradually dwindled to the point that his work became virtually irrelevant, even within the field of parapsychology itself.

work that rendered his conclusions untenable, and the "something other than chance" was attributable to methodological flaws.

As with Rhine, excitement about Schmidt's research gradually dwindled to the point that his work became virtually irrelevant, even within the field of parapsychology itself.

3. The 1970s gave rise to "remote viewing," a procedure through which an individual seated in a laboratory can supposedly receive psychic impressions of a remote location that is being visited by someone else. Physicists Russell Targ and Harold Puthoff claimed that their series of remote-viewing studies demonstrated the reality of psi. This attracted huge media attention, and their dramatic findings (Targ and Puthoff 1974) were published in *Nature*, one of the world's top scientific journals. At first, their methodology seemed unassailable; years later, when more detailed information became available, it became obvious that there were fundamental flaws in procedure that could readily account for their sensational findings. When other researchers repeated Targ and Puthoff's procedure with the flaws intact, significant results were obtained; with the flaws removed, outcomes were not significant (Marks and Kamman 1978, 1980).

Add Targ and Puthoff to the list of "breakthrough" psi researchers whose work is now all but forgotten.

4. In 1979, Robert Jahn, then dean of the School of Engineering and Applied Science at Princeton University, established the Princeton Engineering Anomalies Research (PEAR) unit to study putative paranormal phenomena such as psychokinesis. Like Schmidt, Jahn was particularly interested in the possibility that people can predict and/or influence purely random subatomic processes. Given his superb academic and scientific credentials, his claims of success drew particular attention within the scientific community. When his laboratory closed in 2007, Jahn concluded that "over the laboratory's 28-year history, thousands of such experiments, involving many millions of trials, were performed by several hundred operators. The observed effects were usually quite small, of the order of a few parts in ten thousand on average, but they compounded to highly significant statistical deviations from chance expectations" (PEAR, n.d.).

However, parapsychologists themselves were among the most severe critics of his work, and their criticisms were in line with my own (Alcock 1988). More importantly, several replication attempts have been unsuccessful (Jeffers 2003), including a large-scale international effort led by Jahn himself (Jahn et al. 2000).

5. In the1970s, the ganzfeld, a concept borrowed from contemporaneous psychological research into the effects of sensory deprivation, was brought into parapsychological research. Parapsychologists reasoned that psi influences may be so subtle that they are normally drowned out by information carried through normal sensory channels. Perhaps if a participant were in a situation relatively free of normal stimulation, then extrasensory information would have a better opportunity to be recognized. The late Charles Honorton carried out a large number of ganzfeld studies and claimed that his meta-analysis[3] of this work substantiated the reality of psi. Hyman (1985) carried out a parallel meta-analysis that contradicted that conclusion. Hyman and Honorton (1986) subsequently published a "joint communiqué" in which they agreed that the ganzfeld results were not likely to be due to chance, but they thought that replication involving more rigorous standards was essential before final conclusions could be drawn.

Daryl Bem subsequently published an overview of ganzfeld research in the prestigious *Psychological Bulletin* (Bem and Honorton 1994), claiming that the accumulated data were clear evidence of the reality of paranormal phenomena. That effort failed to be convincing, in part because a number of meta-analyses have been carried out since then with contradictory results (e.g., Bem et al. 2001; Milton and Wiseman 1999). Recently, the issue was raised again in the pages of *Psychological Bulletin*, with papers from Storm et al. (2010a, 2010b) and Hyman (2010). While Storm and coworkers argued that their meta-analyses demonstrate paranormal influences, Hyman pointed to serious shortcomings in their analysis and reminded us that the ganzfeld procedure has failed to yield data that are capable of being replicated by neutral scientists.

Because of the lack of clear and replicable evidence, the ganzfeld procedure has not lived up to the promise of providing the long-sought breakthrough that would lead to the acceptance of psi by mainstream science.

Add Honorton (and Bem the first time around) to the list.

The lesson in this history is that new claims of impressive evidence for psi

should give one pause. Early excitement is often misleading, and as Ray Hyman has pointed out, it often takes up to ten years before the shortcomings of a new approach in parapsychological research become evident.

One must also keep in mind that even the best statistical evidence cannot speak to the *causes* of observed statistical departures. Statistical deviations do not favor arbitrary pet hypotheses, and statistical evidence cited in support of psi could as easily support other hypotheses as well. For example, if one conducted a parapsychological experiment while praying for above-chance scoring, statistically significant outcomes could be taken as evidence for the power of prayer just as readily as for the existence of psi.

Another key consideration is that parapsychology's putative phenomena are all negatively defined: to claim that psi has been detected, all possible normal influences must be ruled out. However, one can never be certain that all normal influences have been eliminated; the reader of a research report has only the experimenter's word for it.

This point brings us to a related concern. Research reports involve an implicit social contract between experimenter and audience. The reader can evaluate only what has been put into print and must presume that the researcher has followed the best practices of good research. We assume that the participants did actually participate and that they were not allowed to use their cellular telephones during the experiment or to chat with other participants. We assume that they were effectively shielded from cues that might have inappropriately influenced their responses. We assume that the data were as reported—that none were thrown out because they did not suit the experimenter—and that they were analyzed appropriately and in the manner indicated. We assume that equipment functioned as described and that precautions reported in the experimental procedure were carefully followed. We take for granted that the researcher set out to test particular hypotheses and did not choose the hypotheses after looking at the data. We must take all this on faith, for otherwise any research publication might simply be approached as a blend of fact, fantasy, skill, and error, possibly reflecting little more than the predilections of the researcher. Obvious methodological or analytical sloppiness indicates that the implicit social contract has been violated and that we can no longer have confidence that the researcher followed best practices and minimized personal bias. As Gardner (1977) wrote, when one finds that the chemist began with dirty test tubes, one can have no confidence in the chemist's findings and must wonder about other, as yet undetected, contamination. So, when considering Bem's present research, not only do we need to look at the data, but—following the metaphor—we need to assess whether Bem used clean test tubes.

Bem's Research

Bem describes a series of nine experiments that "test for retroactive influence by 'time-reversing' well-established psychological effects so that the individual's responses are obtained before the putatively causal stimulus events occur." His stated goal is "to provide well-controlled demonstrations of psi that can be replicated by independent investigators." He defines *psi* as denoting "anomalous processes of information or energy transfer that are currently unexplained in terms of known physical or biological mechanisms."

EXPERIMENT 1: Precognitive Detection of Erotic Stimuli

Each trial in this experiment involved the presentation of an erotic, negative, or neutral picture. The participant sat in front of a computer screen and was tasked to predict which of two curtains had a picture behind it. Only after the participant had chosen a curtain by depressing a key did the computer select a picture at random and present it behind either the left or the right curtain.

Each participant was presented with thirty-six of these trials and was given feedback on each one. The erotic pictures were considered to be "explicit reinforcement for correct 'precognitive' guesses," although no effort was made to determine whether they were indeed reinforcing anything. The main hypothesis was that participants would be able to identify the position of the hidden erotic picture significantly more often than by chance.

So far, clear enough. But then things become quite messy: we learn that "most" of the pictures used in the experiment were selected from a databank, the International Affective Picture System. Bem then states that each session (a "session" refers to all the trials of an individual participant) involved thirty-six trials of randomly intermixed erotic and non-erotic pictures (eighteen of each). However, we soon learn that not all sessions were conducted in this way: the first forty of the one hundred sessions (that is, those of the first forty participants) involved twelve trials of erotic pictures, twelve of negative pictures, and twelve of neutral pictures! (The distinction between the "non-erotic" pictures seen by the majority of the participants and the "neutral" pictures seen by only the first forty is unclear.) To muddle things even more, Bem then states that the remaining sixty sessions involved "18 trials of erotic pictures and 18 trials of non-erotic positive pictures *with both high and low arousal ratings. These included pictures featuring couples in romantic but non-erotic situations*. . ." (emphasis added). How many were of high or low arousal weighting, or what those terms even mean, he does not say.

What is going on here? Setting aside the confusion about the stimulus, no competent researcher dramatically modifies an experiment two-fifths of the way into it! To do so is to seriously compromise any subsequent analysis and interpretation.

But that is not all. Bem next indicates that in all the experiments using highly arousing erotic or negative stimuli, "a relatively large number of non-arousing trials must be included to permit the participant's arousal level to 'settle down' between critical trials. This requires including many trials that do not contribute directly to the effect

We then find that participants were allowed to choose their target set! This is one of the most baffling descriptions of research materials and procedures that I have ever encountered.

being tested." This leaves us not knowing how many trials were actually run and wondering by what method the researcher determined the number of non-arousing trials that were needed to ensure that even the most randy of participants would "settle down."

So by this point, it is not clear how many trials were actually presented to each participant or even whether they all received an equal number of trials. It is unclear just what the stimulus materials were, and we are faced with a procedure that was changed partway through the experiment.

Just when one thinks that this study cannot be made any more confusing, Bem informs us that he discovered in Experiment 5 (which turns out to have been conducted prior to Experiment 1!) that "women showed psi effects to highly arousing stimuli but men did not." In light of this odd complication, Bem states that "we introduced different erotic and negative pictures for men and women in subsequent studies, *including this one* using stronger and more explicit images from Internet sites for the men. We also provided two additional sets of erotic pictures so that men could choose the option of seeing male-male erotic images and women could choose the option of seeing female-female erotic images" (emphasis added).

By now, a careful reader is totally confused as to what went on in this experiment. Now, we find that participants were allowed to choose their target set! This is one of the most baffling descriptions of research materials and procedures that I have ever encountered.

In reflecting on the extremely unusual change in procedure during the experiment—when the appropriate course would be to run two different experiments—one cannot help but wonder if two experiments were indeed run, and when each failed to produce significant results the data from them were combined with the focus shifted to only the erotic pictures common to all participants. Surely that was not done, for such an action would make a mockery of experimental rigor.

Data Analysis: Bem states that "the main psi hypothesis was that participants would be able to identify the position of the hidden erotic picture significantly more often than chance (50%)." At first, this claim is puzzling. Although sixty of the participants completed eighteen trials with erotic pictures and eighteen trials with "non-erotic positive pictures"—therefore making the chance outcome 50 percent of the thirty-six trials—the other forty participants received twelve trials with erotic pictures, twelve with negative pictures, and twelve with neutral pictures. For them, the chance outcome would be 33.3 percent. However, it turns out that Bem combined the data for success or failure, but on the erotic pictures only, from all one hundred sessions (i.e., from all one hundred participants) and then applied t-tests[4] to assess whether identification of the future position of erotic pictures occurred significantly more frequently than the 50 percent rate expected by chance. We are also informed that the hit rate for non-erotic pictures—whether they were neutral, negative, positive, or romantic and non-erotic—did not differ significantly from chance. (This is the first mention of "romantic but non-erotic," which adds to the confusion.)

Now we have learned that the focus of the experiment is on the erotic pictures presented to the participants, but no information is provided regarding how participants with three choices scored on erotic pictures as compared with those who had only two choices; one wonders why this is so.

The data analysis was conducted through multiple t-tests without any correction for that multiplicity. We are informed that there were at least seven such t-tests, and the only significant outcome was that the one hundred participants "identified the future position of erotic pictures significantly more frequently than the 50% hit rate expected by chance: 53.1%." This was stated to be statistically significant at $p = .01$. However, that significance level is simply incorrect. This kind of error (Type I)[5] increases with the number of t-tests conducted, and given that there were at least seven such t-tests with a criterion of $p \leq .01$, the actual probability associated with each of these t-tests is $1 - (.99)^7 = .06$ one-tailed.[6] Thus, none of these t-tests is actually statistically significant, not even at a more generous .05 p value. It is simply unacceptable that Bem did not correct for multiple testing, despite indications later in his report that he is familiar with one such correction technique, the Bonferroni t-test.[7]

Another reason for concern is Bem's deliberate use of one-tailed t-tests, which provide a simpler criterion to meet than the two-tailed tests generally employed by parapsychologists. (Parapsychologists typically interpret both above-chance and below-chance scoring as indicative of psi, and thus they do not make specific predictions about the direction of the extra-chance scoring.) When we say that something is significant at the .01 level two-tailed, this means that we would expect these results to occur by chance alone only 1 percent of the time. But, given that either above-chance or below-chance results are considered to be meaningful, this 1 percent must be distributed in both directions. Thus, above-chance results would be significant at the .01 level two-tailed only if they are so extreme that they would be expected to occur by chance only half of 1 percent, or 0.5 percent, of the time. The same applies for below-chance results.

Bem also reports that he carried out a nonparametric binomial test[8] on the overall proportion of hits on erotic targets across all trials and sessions, but he offers no adequate rationale for using more than one type of significance test for the same data. The test is redundant and offers nothing beyond the t-test.

Then, after having examined the data, he introduces the possibility that introversion/extroversion may play a role in presumed precognitive ability. He suggests that it may be an extrovert's "susceptibility to boredom and the tendency to seek out stimulation" that underlies observed correlations between extroversion and psi performance reported in the literature. However, rather than using existing, well-documented measures of stimulus-seeking, he constructed his own such scale comprising two statements, reversed in scoring: "I am easily bored" and "I often enjoy seeing movies I've seen before." The content and construction of this scale is bewildering. Proper scale construction involves precise and often difficult work, including operationalization of the construct, finding items that can be demonstrated to relate to the construct, endeavoring to ensure that the increments on the response measure are of approximately equal size, and establishing satisfactory reliability and validity of the final scale. Bem has ignored these considerations. As a result, the arbitrary assignment of numbers to participants' responses on this "scale" is unjustified and misleading.

Nonetheless, Bem correlates responses on the scale with the participants' "psi scores" and reports a significant correlation, but only for those participants whose scores on his scale fall above the midpoint. Participants who score below the midpoint on the scale did not score significantly above chance on either erotic or non-erotic trials.

Overall Evaluation: Just about everything that could be done wrong in an experiment occurred here. And even if one chooses to overlook that methodological mess, Bem's data still do not support the claimed above-chance effect because of the multiple-testing problem.

It is difficult to have confidence that the other eight experiments, some of which were carried out earlier than the one just described, were conducted with appropriate attention to experimental rigor: We have toured the laboratory; we have found the dirty test tubes and the mislabeled vials; we have observed inappropriate methodology and analysis. We have lost confidence in the chemist, and there seems little need to poke about further.

Nonetheless, go on we must.

EXPERIMENT 2: Precognitive Avoidance of Negative Stimuli

This study involved 107 female and forty-three male undergraduate students. Using a computer, each participant first responded to Bem's two-item stimulus-seeking scale and then completed a sequence of thirty-six trials in which a "low arousal affectively neutral" picture was presented side by side with its mirror image. The participant depressed a key to indicate which picture he or she liked better. Only after the preference was registered did the computer randomly choose which of the two pictures would be considered the "target." If the participant had chosen this target, the computer thrice flashed a reportedly subliminal "positively valenced picture." If the participant chose the non-target, then a "highly arousing negatively valenced picture" was flashed three times.

A hit was defined as choosing the "target-to-be." However, as in Experiment 1, the description of the situation is difficult to unravel: For the first one hundred sessions (the first one hundred participants), "the flashed positive and negative pictures were independently selected and sequenced randomly." Then there was a change in procedure. For the next fifty participants, "the negative pictures were put into a fixed sequence, ranging from those that had been successfully avoided most frequently during the first 100 sessions to those that had been avoided least frequently." When the participant selected what was to later be designated as the target picture, the positive picture was flashed, subliminally as before, and the negative picture was retained for the next trial. However, when the participant selected the non-target, "the negative picture was flashed and the next positive and negative pictures in the queue were used for the next trial."

This presents the same problem as before—the procedure has been changed partway through the experiment. Bem states that this was done to evaluate the possibility that "the psi effect may be stronger if the most successfully avoided negative stimuli were used repeatedly until they were eventually invoked." It is difficult to get one's head around this justification, and in any case, this should have been examined in a separate study. Again, given the inherent unreasonableness of changing the procedure in an ongoing experiment, one cannot help but wonder if two separate experiments were run and then combined after neither produced significant results on its own.

As in the first experiment, simple t-tests were used to compare partici-

pants' hit rates against the chance hit rate of 50 percent, and a nonparametric binomial test was used to assess the proportion of hits across all sessions. (A third statistic was also calculated; it is said to correct for unequal frequencies of left/right target positions within each session.) In this instance, we are not told how many other t-tests were carried out; if there were other tests, as is likely, this again would have required a correction for multiple comparisons. Of course, because all the data were pooled, we have no information about how many participants actually scored at a level significantly above chance. It seems odd that this information was not of interest.

Bem reports a significant correlation between the score on his two-item stimulus-seeking test and psi performance, but once again the effect was nonsignificant for "low stimulus seekers." (Could it be that Bem has serendipitously invented a two-item scale that predicts psi ability?)

EXPERIMENT 3: Retroactive Priming I

This experiment involved a "priming" paradigm borrowed from contemporary psychological research: participants indicate as quickly as possible whether a picture is pleasant or unpleasant, and their response time is measured. Just prior to the presentation of the picture, a positive or negative word (a "prime") is presented briefly ("subliminally") on the screen. This prime has been shown to have an effect in that participants usually respond more quickly when a positive picture is preceded by a positive word, or a negative picture is preceded by a negative word, than when picture and word are incongruent. Bem refers to this as a *contrast effect*.

Bem has taken this procedure and changed it so that the prime is presented after the participant has responded. He reports a significant contrast effect. His data analyses are very complex, involving two transformations as well as outlier[9] cutoff criteria; without access to the actual data, it is difficult to evaluate the adequacy of the analysis. However, it is obvious once again that multiple comparisons were carried out without any control for multiple testing.

EXPERIMENT 4: Retroactive Priming II

Experiment 4 is described as a replication of Experiment 3 "with one major change and two timing changes." Similar positive results were reported. Again, one would need access to all the data, including the discarded outliers, before one could properly evaluate the stated conclusions.

EXPERIMENT 5: Retroactive Habituation I

After the presentation of the previous four experiments, we are now informed that Experiment 5 was a pilot for the basic procedures used in the other experiments in this article. Why it is presented as the fifth experiment is not explained.

The experiment employed a mere-exposure protocol[10] borrowed from experimental psychology, but Bem "runs it backwards." The participant is presented with two pictures side by side. One is the "habituation target" and the other is "closely matched" to the habituation target. The participant is then instructed to indicate which picture he or she likes better. Only then is the participant repeatedly exposed, subliminally, to a picture of the "habituation target." If it turns out that the habituation target is the one that was earlier chosen, this is considered a "hit;" it is assumed that the effect of the repeated subliminal exposure to the target *after* the participant had made a choice operated backward in time to influence that original choice.

The habituation target was chosen 53.1 percent of the time, which is reported to be significant at the .014 level one-tailed. However, once again multiple t-tests (six) are reported, which means that the actual p values need to be adjusted. (Suppose that Bem had begun with .014 as the criterion value; then the actual Type I error would be $12(12.014)^6 = .08$, which is not significant).

Incidentally, Bem reports that the hit rate was significantly above chance for women but not for men. Nonetheless, he also states that there was *not* a significant sex difference! Though this seeming contradiction can arise statistically, it is up to the researcher to make sense of it—which Bem does not.

EXPERIMENT 6: Retroactive Habituation II

Experiment 6 is described as a replication and extension of Experiment 5. Trials with erotic picture pairs were added, and it was hypothesized that the outcome for erotic pictures would be the opposite of that for the negative pictures and that the participants would prefer the habituation picture in fewer than 50 percent of the trials. Bem does not explain his reasoning. There was also another change: on the basis that men may have simply been less aroused than women by the erotic pictures in Experiment 5, thus leading them to not produce a significant effect, it was decided to use stronger and more explicit negative and erotic images obtained from Internet sites for male subjects. Men were also given the choice of male-male erotic images and women the choice of female-female erotic images. (The reader will recall that this was also done in Experiment 1, which was run after Experiment 5.) Such matters should be investigated in further pilot studies rather than incorporated into what is billed as a replication experiment.

Bem also tells us that he had not yet introduced by this point his two-item stimulus-seeking scale into his series of experiments (remember, Experiments 5 and 6 were at the beginning of this series of nine). Instead, he constructed another *ad hoc* scale by converting two items from Zuckerman's (1974) well-known Sensation-Seeking Scale into true-false statements: "I enjoy watching many erotic scenes in movies" and "I prefer to date people who are physically exciting rather than people who share my values." He gives no reason for choosing only these statements, but he does not hesitate to treat them as a reliable and valid measure. While showing no concern for the psychometric properties of these two statements, he then arbitrarily defines only those who endorse both statements as

"erotic stimulus seekers." Thus, an individual who enjoys "many erotic scenes in movies" but prefers to date people who share his/her values was not considered to be an erotic stimulus seeker. This is purely an *ad hoc* and unacceptable procedure, again suggesting a cavalier attitude about the rigors of proper experimentation.

As for the data analysis, once again there were numerous t-tests without any control for multiple testing, thereby rendering erroneous the claimed significance levels.

Making choices about data analysis after the data are collected introduces unacceptable opportunity for bias and allows selection of a method that suits one's hypothesis.

EXPERIMENT 7: Retroactive Induction of Boredom

The hit rate was not reported to be significant in this experiment. The reader is therefore spared my deliberations.

EXPERIMENT 8: Retroactive Facilitation of Recall I

This experiment was an attempt to test the hypothesis that the future rehearsal of a set of words can make them easier to recall in the present. (Students would be delighted if this effect could be verified and harnessed, for they could then do further study following a difficult exam and presumably improve their performance on the examination already taken). The design was simple. Participants were shown a set of words and then were tested for their recall of the words. Subsequently, they were given practice exercises with a randomly selected subset of those words, and the hypothesis was that as a result of this subsequent practice, their performance on the test (in the past, remember) would be enhanced and they would have (in the past) recalled more of the words that were practiced in the present.

The participants were one hundred undergraduates. Again, they first responded to the two stimulus-seeking statements. Next, forty-eight common nouns were presented serially for three seconds each. The participant was then asked to type out all the words he or she could recall. The computer then selected twenty-four words at random, and the participant was now instructed to type each of the selected words. It was hypothesized that these practiced words would turn out to be the ones that had been better recalled (before the practice).

Each recalled word was deemed to be a trial and was scored as either a practice or a control word. The actual difference—recall of practice words minus recall of control words—was not analyzed; only a weighted score was given, which was that difference multiplied by the participant's overall score (on both practice and control words). We are told that this was done to give more weight to the scores of those participants who recalled more words. No appropriate justification is given for this awkward analysis; an analogy is drawn with the practice of weighting studies by their sample size in a meta-analysis, but this is a spurious analogy. The apparently arbitrary weighting of scores, when the more direct-difference scores would offer less ambiguity, renders these findings extremely difficult to interpret. Making choices about data analysis after the data are collected introduces unacceptable opportunity for bias and allows selection of a method that suits one's hypothesis.

Making matters more complicated, Bem then informs us that another twenty-five "control" sessions were run, similar to the sessions outlined above but without any practice sessions. These control sessions were interspersed among the experimental sessions. The overall recall of words in his control sessions was no different than that in the experimental sessions, and so he concluded that "the enhanced recall of practice words came at the expense of diminished recall of control words."

Again, it was found that participants who scored low in terms of his stimulus-seeking scale scored at the chance level in the recall test, while those high in stimulus seeking scored above chance.

EXPERIMENT 9: Retroactive Facilitation of Recall II

This is described as a replication of Experiment 8, with one procedural change: a new practice exercise was introduced "immediately following the recall test in an attempt to further enhance the recall of the practice words." Again, weighted scores were calculated, and on this basis a significant result was obtained. However, on this "replication," the stimulus-seeking questions did *not* correlate with psi success. My concerns about the data analysis in Experiment 8 similarly apply in this case.

Overall, then, this is a very unsatisfactory set of experiments that does not provide us with reason to believe that Bem has demonstrated the operation of psi. All that he has produced are claims of some significant departures from chance, and these claims are flimsy given the many methodological and analytical problems that I have touched on in this review. Moreover, Ray Hyman has noted (in my personal

We have toured the laboratory; we have found the dirty test tubes and the mislabeled vials; we have observed inappropriate methodology and analysis. We have lost confidence in the chemist, and there seems little need to poke about further.

communication with him) that the correlation of effect size (as well as significance level) with sample size is highly significant across this set of Bem's experiments, but it is in the wrong direction! "Effect size," simply put, refers in this case to the magnitude of the difference between the observed scoring rate and the chance rate. Larger samples provide a better opportunity to detect such a difference if it is truly there, and thus effect size should increase with increased sample size. However, in Bem's experiments, the effect size correlates *negatively* (–.91) with sample size, indicating that the claimed effect is smaller when the sample size is larger.

Statistical power is a related concept that refers to the ability to detect an effect when it is actually there. Hyman notes that while power (he uses the log of significance probability as a proxy for power) should be positively correlated with sample size (technically with the square root of sample size), in this series of studies the correlation is approximately .80—*in the wrong direction* once again. This raises a bright red flag and further erodes confidence with regard to the conduct of this research.

* * *

Having presented his nine experiments, Bem then discusses a number of general issues in parapsychology research and then turns to quantum mechanics! Even if one were to take his interpretation of his results at face value, the claimed results are small and hardly justify an incursion into quantum mechanical theory in the pursuit of accommodation of psi phenomena within modern scientific theory.

While it may seem puzzling that this distinguished psychologist has produced such flawed research, anyone who has read his "Writing the Empirical Journal Article" (published on his website at http://dbem.ws/WritingArticle.pdf) would not be surprised. There he provides advice to students regarding the conduct of research. A few revealing selections (emphasis added):

> *Once upon a time*, psychologists observed behaviour directly, often for sustained periods of time. No longer. Now, the higher the investigator goes up the tenure ladder, the more remote he or she typically becomes from the grounding observations of our science. If you are already a successful research psychologist, then you probably haven't seen a participant for some time. Your graduate assistant assigns the running of a study to a bright young undergraduate who writes the computer program that collects the data automatically. And like the modern dentist, *the modern psychologist rarely sees the data until they have been cleaned by human or computer hygienists.*
>
> To compensate for this remoteness from our participants, let us at least become intimately familiar with the record of their behaviour: the data. Examine them from every angle. Analyze the sexes separately. Make up new composite indexes. If a datum suggests a new hypothesis, try to find additional evidence for it elsewhere in the data. If you see dim traces of interesting patterns, try to reorganize the data to bring them into bolder relief. If there are participants you don't like, or trials, observers, or interviewers who gave you anomalous results, drop them (temporarily). Go on a fishing expedition for something—anything—interesting. . . .
>
> When you are through exploring, you may conclude that the data are not strong enough to justify your insights formally, but at least you are now ready to design the 'right' study. . . . Alternatively, *the data may be strong enough to justify re-centering your article around the new findings and subordinating or even ignoring your original hypotheses.* . . .
>
> Your overriding purpose is to tell the world what you have learned from your study. If your research results suggest a compelling framework for their presentation, adopt it and make the most instructive findings your centerpiece. Think of your data set as a jewel. *Your task is to cut and polish it, to select the facets to highlight, and to craft the best setting for it. Many experienced authors write the results section first.*
>
> But before writing anything, Analyze Your Data!

Reflections of this advice appear to be writ large throughout Bem's research article.

* * *

The publication of this set of experiments will serve no one well. Parapsychology is not honored by having this paper accepted by a mainstream psychology journal. Neither does Bem's paper serve the public well, for it only adds to confusion about the scientific case for the existence of psi. And it does no service to the reputation of the *Journal of Personality and Social Psychology*. Although Bem has failed to demonstrate the existence of mysterious intellectual powers that defy the normal constraints of time and space, there seem nonetheless to have been mysterious intellectual powers at play here. I refer to

the decision by the editors of an esteemed psychology journal to publish this badly flawed research article.

"Think of your data set as a jewel," Bem instructs. However, with these nine experiments, Bem did not end up with a polished jewel. Rather, to extend his metaphor, the jewel cracked under the intense pressure used to try to shape it to fit expectation. One is left with nothing but useless fragments that reflect not the light of knowledge but the biases of the researcher.

Rhine, Schmidt, Targ, Puthoff … the list grows on. *Plus ça change, plus c'est la même chose*. ■

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Notes

1. My discussion is based on the pre-publication version of Professor Bem's article that appears on his website at www.dbem.ws/FeelingFuture.pdf.

2. The *p value* is the likelihood of having concluded that there is a significant effect when in fact there is not. The lower the p value, the less likely it is that the null hypothesis (that there is no effect) is true.

3. *Meta-analysis* is a statistical process for testing the combined results of a number of studies that were based on similar research hypotheses.

4. The *t-test* is a statistical test typically used either to compare two means or to compare a mean with a theoretical expectation—for example, to assess the difference between an observed average success rate and a hypothetical chance rate of 50 percent.

5. A *Type I error* occurs when the null hypothesis (that there is no effect) is rejected when it is in fact true.

6. In a *two-tailed test,* one assesses the data to see whether they significantly differ from what would be expected by chance in either direction, that is, whether they are greater than or less than what would be expected by chance alone. When we say that something is significant at the .01 level two-tailed, this means that we would expect these results to occur by chance alone only 1 percent of the time. But, given that either above-chance or below-chance results are considered to be meaningful, this 1 percent must be distributed in both directions. Thus, above-chance results would be significant at the .01 level (two-tailed) only if they are so extreme that they would be expected to occur by chance half of 1 percent, or 0.5 percent, of the time or less. The same would apply for below-chance results.

With a *one-tailed test*, one also assesses the data to see whether they significantly differ from what would be expected by chance but in only one direction, that is, whether they are either greater than expected by chance or less than expected by chance, but not both. A one-tailed test is properly used if one has good reason to predict the direction of the data in advance. Again, using the example of the .01 level, for a one-tailed test the data only need be extreme enough that they would be expected by chance alone 1 percent of the time or less (compared to 0.5 percent with a two-tailed test). This makes it much easier to claim statistical significance.

Parapsychologists normally employ two-tailed tests because results that are either significantly above chance or significantly below chance are taken to reflect psi. Although Bem indicates that he predicted that the erotic pictures would lead to above-chance scoring, which could justify using a one-tailed test, what would he have done had the participants scored at a below-chance rate that would have been significant had he predicted that the results would indeed be below chance? Apparently committed to a one-tailed test and having made only the above-chance prediction, he properly would have had to ignore those data—something that parapsychologists do not want to do. By using two-tailed tests, parapsychologists avoid the problem and also avoid any suspicion of having changed the direction of their prediction after having examined the data.

7. The *Bonferroni t-test* is a modified t-test that adjusts for the number of tests being carried out so that the overall likelihood that one of them produces significance by chance alone is kept at a specified level, such as 5 percent.

8. A *nonparametric binomial test* deals with data divided into two categories and examines the statistical significance of deviations from a theoretically expected distribution. It is referred to as "nonparametric" because it does not rely on the parameters of a distribution, such as the mean.

9. An *outlier* is a datum that is numerically distant from all the other data in the sample, either as a result of measurement error or because the data are not distributed in the manner that was assumed.

10. *Mere-exposure protocol* is a research approach in which participants' responses are assessed with the assumption that having simply been exposed (perhaps subliminally) to a stimulus object will cause an effect.

References

Alcock, J.E. 1988. A comprehensive review of major empirical studies in parapsychology involving random event generators and remote viewing. In Commission on Behavioral and Social Sciences and Education, *Enhancing Human Performance: Issues, Theories and Techniques, Background Papers.* Washington, D.C.: National Academy Press, 601–719. Available online at http://books.nap.edu/openbook.php?record_id=778&page=601.

Bem, D.J., and C. Honorton. 1994. Does psi exist? Replicable evidence for an anomalous process of information transfer. *Psychological Bulletin* 115: 4–18.

Bem, D.J., J. Palmer, and R. Broughton. 2001. Updating the ganzfeld database: A victim of its own success. *Journal of Parapsychology* 65: 1–6.

Gardner, M. 1977. ESP at random. *New York Review of Books*, July 14.

Hyman, R. 1985. The ganzfeld psi experiments: A critical appraisal. *Journal of Parapsychology* 49: 3–49.

———. 2010. Meta-analysis that conceals more than it reveals: Comment on Storm et al. [2010a]. *Psychological Bulletin* 136(4): 486–90.

Hyman, R., and C. Honorton. 1986. A joint communiqué: The psi ganzfeld controversy. *Journal of Parapsychology* 50: 351–64.

Jahn, R., B. Dunne, G. Bradish, Y. Dobyns, A. Lettieri, R. Nelson, J. Mischo, E. Boller, H. Bosch, D. Vaitl, J. Houtkooper, and B. Walter. 2000. Mind/machine interaction consortium: PortREG replication experiments. *Journal of Scientific Exploration* 14: 499–555.

Jeffers, S. 2003. Physics and claims for anomalous effects related to consciousness. In J.E. Alcock, J. Burns, and A. Freeman (Eds.), *Psi Wars: Getting to Grips with the Paranormal.* Exeter, UK: Imprint Academic, 135–52.

Marks, D., and R. Kamman. 1978. Information transmission in remote viewing experiments. *Nature* 274: 680–81.

———. 1980. *The Psychology of the Psychic.* Buffalo, NY: Prometheus Books.

Milton, J., and R. Wiseman. 1999. Does psi exist? Lack of replication of an anomalous process of information transfer. *Psychological Bulletin* 125: 387–91.

PEAR (Princeton Engineering Anomalies Research). n.d. Experimental research. Available online at www.princeton.edu/~pear/experiments.html.

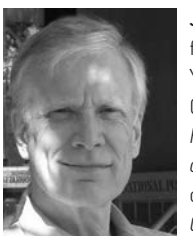
Rhine, J.B., and W. McDougal. 1934/2003. *Extra-Sensory Perception*. Whitefish, MT: Kessinger Publishing.

Storm, L., P.E. Tressoldi, and L. Di Risio. 2010a. Meta-analysis of free-response studies, 1992–2008: Assessing the noise reduction model in parapsychology. *Psychological Bulletin* 136: 471–85.

———. 2010b. A meta-analysis with nothing to hide: Reply to Hyman. *Psychological Bulletin* 136: 491–94.

Targ, R., and H. Puthoff. 1974. Information transmission under conditions of sensory shielding. *Nature* 251: 602–4.

Zuckerman, M. 1974. The sensation seeking motive. In B.A. Maher (Ed.), *Progress in Experimental Personality Research* (Vol. 7). New York, NY: Academic Press, 79–148.



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A response to this article from Daryl Bem plus author Alcock's detailed reply to Bem's response are on our website at

www.csicop.org

Seven Deadly Medical Hypotheses

Many medical hypotheses have been ill-conceived and/or inadequately tested. As a consequence, billions of dollars have been wasted and the public harmed.

REYNOLD SPECTOR

A chronic scandal plagues the medical and nutritional literature (Spector and Vesell 2006; Spector 2009): much of what is published is erroneous, pseudoscientific, or worse. Two major factors account for a large portion of this problem. First, many medical and nutritional hypotheses are ill-conceived (Spector 2009). Second, the methods used to test hypotheses are often epistemologically unsound (Spector 2009). Moreover, the same unsound methods are often repeated multiple times on the same tired hypotheses with the same incorrect results. In such studies—which may look superficially adequate to the unsophisticated reader—complex data are collected and displayed, pseudo-statistical analyses are performed, and erroneous conclusions are drawn and extrapolated to the general public.

Indeed there is an epidemic of published studies that do not follow the principles of sound medical science—the principles demanded (for example) by the U.S. Food and Drug Administration (FDA) for the licensure and sale of medications. The resulting "findings" of such misleading or erroneous studies are often hyped by news media on the day they are reported or published without any additional, careful analysis. Worst of all, it sometimes takes decades to overturn these false results—to find and report the truth (Spector and Vesell 2006; Spector 2009).

How and why does this happen?

Background

For decades we have understood how to perform medical and nutritional experiments that test a hypothesis. Good science classifies, explains, and predicts phenomena. Great emphasis is placed on testable cause-and-effect relationships. To do good science, a series of standard assumptions must be made (e.g., there is a mind-independent world; there is regularity in nature; the well-documented past can predict the future; and so on). We all believe the unprovable notion that the sun will rise tomorrow.

These assumptions must be made within the "hard" sciences, such as physics and chemistry, in which necessary and sufficient causes for effects have been discovered that have led to the establishment of nomological principles (laws of nature). Standard assumptions are also necessary in medical and nutritional research, much of which (unlike research in chemistry and physics) must establish contributory causality because multiple "causes" often exist for one effect. Due to the nature of medical science, probability theory and sound statistical methods are often required to establish causality. (See Spector and Vesell 2006 and Spector 2009 for a more detailed account of these points.)

Methodologically, to find the truth in medical and nutritional research in general, the investigator must generate a hypothesis. This can be done by intuition and/or genius (as in the cases of Einstein and Newton); more commonly, a hypothesis results from carefully analyzing existing data, observing experiments of nature (that is, spontaneous biological abnormalities in people), making an analogy with a similar situation, or other means. It is critical

in medical and nutritional research that the generated hypothesis has biological plausibility.

After a plausible hypothesis is generated, deductions and predictions can be made from the hypothesis. Then scientific attempts are made (e.g., through properly controlled experiments) to falsify or verify the deductions and predictions—and secondarily to falsify or verify the hypothesis. In general, falsification is more convincing than verification (Spector and Vesell 2006).

Let's look at an example of superior medical hypothesis testing. After years of inconclusive epidemiology/observation studies (for reasons discussed below), a scientific test of the cholesterol hypothesis ("High cholesterol is a contributory cause of heart disease and stroke") was finally performed by the Scandinavian Simvastatin Survival Study (4S) Group (1994). The tested statement (deduced from the above hypothesis) was that "If you lower cholesterol with a safe drug, you will save lives." In the 4S study, 4,444 coronary heart disease patients with high cholesterol were randomly assigned to receive daily simvastatin (now an inexpensive generic drug that greatly lowers total plasma cholesterol) or a placebo. Death was the primary endpoint. The study was "blinded": neither the patient nor the investigator (or even the sponsor) knew which patients were taking the drug or which were taking the placebo until the study was completed. After about five years, one-third fewer patients who took simvastatin were dead ($p < .001$). This trial conclusively established that simvastatin saved lives, and it was consistent with (but did not prove) the notion that high cholesterol was "causally" related to death due to heart disease and stroke. It is critical to note that in this exemplary study there was only one dependent variable (whether the patient was taking simvastatin or placebo) and one primary outcome (alive or dead—an endpoint that is clear and unarguable). Operationally, the primary endpoint was determined in all patients: a very rare phenomenon in clinical research.

The 4S study's results are an example of the power of the hypothetical/deductive method. In trials such as the 4S study, which was randomized, blinded, controlled, adequately powered (that is, based on enough human subjects to yield a meaningful experimental result [Spector 2009]), and representative of the to-be-treated population, results can then be (and were) extrapolated to similar patients with heart disease. However, because of the mortality data from the 4S study and the nature of contributory causality (that is, many factors influence death due to cardiovascular disease), we can only say *prospectively* that if a patient takes simvastatin, he has about a one-third less risk of dying over a five-year period (on average, for an individual heart-disease patient with high cholesterol). In other words, there are sometimes multiple "causes" of an effect; manipulation of a single cause can be helpful overall but is not the whole story.

In short, the hypothetical/deductive method, when applied, has systematically and conclusively answered many questions (hypotheses) in clinical medicine and human nutrition. This method is the standard that the FDA demands for new drug licensure.

Unfortunately, too many published studies fail to adhere to these high scientific standards and therefore lead to faulty, and even dangerous, conclusions. In what follows, I will indicate the seven deadly hypotheses in **this bold type.**

Deadly Hypothesis One

Over the past fifty years, multiple investigators have argued that you don't need to follow the hypothetical/deductive method to find the truth. Either **the investigator does not need a specific hypothesis and/or can use an inadequate method to test the hypothesis** (Glass and Hall 2008).

> The resulting "findings" of such misleading or erroneous studies are often hyped by news media on the day they are reported or published without any additional, careful analysis.

One of the best examples of inadequate methodology is the use of epidemiology/observation studies to verify or falsify causal hypotheses when contributory causality is postulated (Spector and Vesell 2006; Spector 2009). Epidemiology/observation studies are often termed *case-control studies* (which are retrospective) or *cohort studies* (which are prospective). Such studies are sometimes used to test a hypothesis (e.g., "Postmenopausal women who take hormone replacement therapy [HRT] have less cardiovascular disease than women who do not" [see deadly hypothesis two]). However, a fundamental problem with the epidemiology/observation approach is that control subjects and experimental subjects are not randomized,

which often leads to unknown bias (prejudicial error on the part of the researcher) and confounding (a problem that can occur when more than one experimental variable is in play)—with subsequent erroneous results. Moreover, statistics are often misapplied to such data, meaning that data often do not meet the basic assumptions necessary for statistical analysis (see Spector and Vesell 2006 and Spector 2009 for more details).

I will present examples of erroneous conclusions based on epidemiology/observation studies and then describe them in more detail. Because such studies often lead to unreliable conclusions, the FDA will generally not accept such studies for drug licensure.

Another example of studies in which there is a lack of a specific hypothesis is the currently popular genome-wide association studies, or GWAS (Pearson and Manolio 2008). Such studies assume that in common diseases such as Alzheimer's and heart disease, there are multiple "abnormal" genes that "cause" these diseases. If researchers "fish" in the genome, they will find the "causative" genes. However, these investigators ignore the strong possibility of epigenetic, developmental, environmental, or other potential causes of disease (e.g., gene-environment interactions or the possibility that the GWAS approach is incapable of finding the truth). It could even be that the problem lies in the regulation of gene function or the introns of genes—which GWAS will not find. Hence, GWAS are probably too simplistic and, as I note below, generally fail.

Investigators using the GWAS approach eschew the hypothetical/deductive randomized approach because they assume that they can survey the entire genome efficiently and find abnormalities (Pearson and Manolio 2008; Psychiatric GWAS Consortium Coordinating Committee 2009). Before describing GWAS, we should briefly review certain basic facts about the human genome (HG). The HG is composed of more than three billion bases, which contain approximately 22,000 genes. These genes in turn code for more than 100,000 different proteins. Less than five percent of the HG codes for the production of human genes. Approximately 0.1 percent (about twenty million) of the bases vary in humans from individual to individual. These are called *single nucleotide polymorphisms* (SNP). Approximately one to four million common SNP can be measured in GWAS.

Many assumptions are necessary for GWAS to work. I briefly summarize these assumptions and the GWAS methodology in table 1 (Pearson and Manolio 2008; Psychiatric GWAS Consortium Coordinating Committee 2009). Each assumption is fraught with potential or actual problems. Moreover, unlike in other approaches, GWAS cannot detect rare SNP or small genetic deletions or amplifications. Exemplifying the pitfalls of using this nonrandomized approach, investigators sometimes find SNP in patients (but not control subjects) in areas of the genome that have no genes, or an "abnormal gene" is sometimes identified (e.g., the *FTO* gene that "causes" obesity). In the case of *FTO*, however, "knockout" mice missing the *FTO* gene were made, and surprisingly these mice were perfectly normal (Psychiatric GWAS Consortium Coordinating Committee 2009)! Other potential problems with GWAS are noted in Pearson and Manolio 2008.

Table 1
Methods and Assumptions in Genome-Wide Association Studies (GWAS)

1) One can measure accurately approximately one or more million single nucleotide polymorphisms (SNP) in an individual.
2) Specific SNP segregate (travel) with abnormal genes (this is termed *linkage disequilibrium*).
3) Patients can be fruitfully compared with controls using GWAS, although the subjects are not randomized; SNP associated with abnormal genes can be found in patients but not control subjects.
4) Accurate data can be obtained.
5) Because there are many (approximately 50,000) false positives per individual in GWAS at a $p < .05$ significance level, complex statistical methods must be employed. The nonrandomized nature of the comparisons makes the statistical analysis even more problematic.
6) The results can be repeated in other patient and control-subject populations.
7) After the abnormal SNP is located, the abnormal gene in the genetic neighborhood can be located.

On balance, notwithstanding the great optimism of several years ago, the GWAS method has been a disappointment. An immense amount of time and money has been spent, but there have been no robust genetic findings in either Alzheimer's or heart disease; the GWAS method must now be considered a failure (Couzin-Frankel 2010; Pedersen 2010). The general approach of "It's in the genes and GWAS should find it" has not succeeded. After all this expensive negative experimentation, the causes of Alzheimer's and heart disease could still be genetic. GWAS have also been employed to test how certain drugs work (e.g., lithium in manic-depressive psychosis). As expected, with no up-front hypothesis and dubious methodology, the results have been fruitless (Perlis et al. 2009).

In summary, the high hopes (hype) for GWAS—which was expressed soon after the HG was sequenced about ten years ago—have not yet translated into much progress (with a few exceptions) (Le Fanu 2010). GWAS need to be replaced by direct sequencing of the portions of the genome of interest, comparing patients with proper control subjects. This work can and should be done. As I have noted, it is entirely possible that non-genetic causes are re-

sponsible for the diseases that have thus far been studied with GWAS.

Deadly Hypothesis Two

Advocating the widespread use of postmenopausal hormone replacement therapy (HRT) with estrogen and progestin was a serious error. This advocacy was based, in part, on erroneous epidemiology/observation studies. Taking advantage of these (now known to be erroneous) data, the pharmaceutical industry instituted heavy advertising campaigns for HRT products. Let's review the background information and hypothesis.

Menopausal women stop secreting estrogen and progesterone, two hormones associated with youth and fertility. The hypothesis was that **if women replace these missing hormones postmenopausally with HRT, they will remain "youthful" and not suffer from heart disease, dementia, vaginal dryness, hot flashes, and fractured bones.** To maintain this effect, the patient must take HRT indefinitely. The proponents of this hypothesis ignored the well-documented fact that estrogen is a carcinogen that causes breast cancers that kill women (Chlebowski et al. 2010).

This HRT hypothesis was tested in over one hundred nonrandomized case-control and cohort studies. Instances of health problems such as heart attack, stroke, blood clots, fractures, and so forth were compared in the women taking estrogen (and progestin, a synthetic form of progesterone) against women not taking HRT. Based on these (biased) studies, false claims were made that HRT protected against cardiovascular disease and dementia. However, it turned out that HRT *did* protect against fractures and postmenopausal symptoms (e.g., hot flashes, vaginal dryness) and that HRT caused a 25 percent increase in invasive breast cancer, a finding later confirmed in the controlled, scientific trials (Chlebowski et al. 2010).

Unfortunately the investigators ignored the fact that epidemiology/observation studies cannot reliably establish causality unless they satisfy the rigorous Hill criteria (Spector and Vesell 2006; Spector 2009). The Hill criteria are standard, accepted criteria to establish causality in epidemiology/observation studies. Moreover, statistics cannot be applied to epidemiology/observation studies because they are not randomized and therefore don't satisfy the assumptions for proper statistical analysis. Finally, why would an investigator, in advance, expect postmenopausal women who take HRT to be the same in all other respects as women who do not take HRT (a basic assumption of the epidemiology/observation studies)? Thoughtful observers would guess that women who take HRT are more health conscious. As might be expected, bias and confounding invalidated most of the findings of these studies, although (as indicated above) a few findings turned out to be correct.

The FDA, Dr. Bernadine Healy (as director of the National Institutes of Health [NIH], 1991–93), and others did not accept these optimistic claims for HRT based on epidemiology/observation studies. Instead, a group in California, along with the NIH, initiated proper large, prospective, randomized, blinded, controlled trials (Banks and Canfell 2009; Prentice et al. 2009). The results clearly showed that HRT was harmful overall. HRT did decrease postmenopausal symptoms and fractures, but it increased risks of cardiovascular disease (including stroke), invasive cancer of the breast (by about 25 percent [Chlebowski et al. 2010]), and probably dementia. Based on HRT use and a 25 percent increase in breast cancer, this generally unnecessary use of HRT caused approximately 5,000 more deaths per year from breast cancer (Chlebowski et al. 2010). (As an aside, in legal challenges the U.S. Supreme Court has upheld the notion that HRT causes breast cancer.) There is now a broad consensus, based on controlled studies, that HRT should not be used by postmenopausal women for chronic disease prevention; instead, HRT should be used only for *short-term* suppression of severe postmenopausal symptoms at the *lowest effective dose*.

This is a flagrant example of the harm done by straying from the principles of the hypothetical/deductive approach and sound clinical science. It took over twenty years to correct this error, and in the process many women were harmed.

Deadly Hypothesis Three

Vitamins A through E are essential dietary substances. Required quantities are suggested in the recommended dietary allowances (RDAs). However, in several situations, more may be needed (e.g., in the elderly, who often require more of vitamins B12 and D, and in people with certain rare disorders [Spector 2009]). Based on analogy arguments, some investigators suggest that **if small dosages of vitamins are good for humans, very large doses (megavitamin therapy) would be better for everyone.** These vitamins include vitamins C and E and the B vitamins. (High doses of vitamin A and D are very toxic.) In megavitamin therapy, the dose is at least ten times larger than the RDA.

This general hypothesis does not have biological plausibility because the human body has very efficient homeostatic systems that keep tissue vitamin levels constant. I pointed this out to Linus Pauling in a 1977 issue of the *New England Journal of Medicine*. At that time, Pauling believed that megavitamin therapy with vitamin C improved cognitive function. I observed that it is not possible to more than double the plasma level of vitamin C, even with gram quantities of oral vitamin C; the RDA is 60 milligrams (Spector 1977). Second, a doubling of the plasma level will increase the brain concentration of vitamin C by less than 10 percent. Pauling accepted this and abandoned the argument that vitamin C improves mental functioning, but many others did not.

In fact, a vast megavitamin industry has sprung up to satisfy the unscientific demand for megavitamin amounts of B, C, and E. As I and others have pointed out, the epidemiology/observation stud-

ies suggesting that vitamins B, C, and E are beneficial in preventing heart disease, cancer, and dementia were subsequently disproved in huge well-controlled scientific trials (Spector 2009). Recently, megavitamin E was shown not to prevent cataracts after over ten years of use (Christen et al. 2008).

A similar hypothesis (again based on erroneous epidemiology/observation studies) is that megavitamins B6, folate (B9), and B12 taken in combination lower the homocysteine blood level and thus prevent cardiovascular disease and stroke. Multiple controlled trials of this hypothesis have been performed in people with and without an elevated homocysteine blood level. Although there was a decrease in plasma homocysteine level, there was no beneficial effect on cardiovascular disease and stroke in healthy people (House et al. 2010). There was no obvious harmful effect in healthy subjects either. However, in renal-failure patients, whose homeostatic systems cannot control plasma vitamin levels well, there were further declines in renal function and more heart attacks, strokes, and deaths in the megavitamin group ($p < .04$) (House et al. 2010). Because many elderly people (over age sixty-five) have decreased renal function, megavitamin B therapy is probably also risky for them. Megavitamins B, C, and E should carry warnings discouraging their use by patients with renal failure and those over sixty-five until there is convincing evidence of benefit.

In summary, megavitamin therapy tested in properly controlled trials either does nothing or is harmful (with a few well-defined exceptions) (Spector 2009; House et al. 2010). The hypothesis was never biologically plausible, and the results are clear. The epidemiology/observation studies were once again misleading. Disproving the megavitamin hypotheses has cost hundreds of millions of dollars; even worse, the public's current widespread use of these worthless preventatives runs into billions of dollars. Notwithstanding the overwhelming evidence that it is harmful or useless, megavitamin therapy is still widely used. Why? The psychological, commercial, and historical reasons are multiple and very complex, due in part to the constant recycling of old, incorrect data (Spector 2009). In my view, Congress should give the FDA the authority to regulate or prohibit the sale of worthless, or in some cases even harmful, supplements. Convincing the public not to use worthless supplements is like successfully cutting off all of a hydra's heads at once—it is not possible unless you are a Hercules.

Deadly Hypothesis Four

Many doctors incorrectly believe that **screening tests beyond the standard medical examination[1] are necessary for identifying disease or the risk of disease in apparently healthy, asymptomatic adults.** Common sense argues strongly for this hypothesis. But the evidence for it is weak.

Only a few tests have withstood the challenges of experimentation and time (e.g., the Pap test for cervical cancer, colonoscopy). For example, forty years ago, it was recommended that all adults have an annual chest X-ray examination, a bad idea now abandoned. More recently, all men over age forty were urged to have a prostate-specific antigen (PSA) test to screen for prostate cancer. However, careful studies have suggested that such screening does more harm than good (Spector 2010). In fact, in a recent *New York Times* editorial (Ablin 2010), the discoverer of the PSA test vituperatively argued against the utility of PSA screening for prostate cancer, consistent with my earlier arguments (Spector 2010).

Even the use of mammography for breast-cancer screening is not without its critics and skeptics (Kalager et al. 2010). Although it is often true that early detection of breast cancer is useful, approximately 62,000 cases of ductal carcinoma *in situ* (DCIS) are discovered every year in the United States, especially in older women (Spector 2010). In more than 50 percent of these cases, the lesion will not progress and does not need more than simple treatment (e.g., clinical biopsy or long-term follow-up observation). However, we do not know which patients to treat vigorously, so almost all women with DCIS are currently treated with surgery and/or radiation, and some of them are given chemotherapy. This means that about 30,000 women per year are unnecessarily treated. However, all things considered, on balance, mammography every other year is probably reasonable. We must figure out who with DCIS doesn't need treatment and who does (Kalager et al. 2010).

In the past several years, certain commercial laboratories have begun to offer genetic screening to identify disease risk in adults (Offit 2008). These tests include GWAS, sequencing the genome, testing for "known" SNP (e.g., breast and prostate cancer), or testing for paternity and family relationships. Some companies even suggest products or recommendations for skin, nutritional, or body-weight concerns using

Table 2
Problems with Genetic Screening

1) Validation and accuracy of methods are often unknown, causing a problem of false positives
2) Lack of regulatory oversight
3) May reveal a very small risk (in most cases) of developing the disease (e.g., Crohn's disease)
4) Even if risk is discovered, there may be no effective intervention
5) Cost of testing
6) Unproven utility of pharmacogenetic testing, even if convincing differences are found
7) Psychological damage in some cases
8) Inability for even experts to interpret some tests
9) Commercial laboratories are profit driven in a direct-to-consumer approach—in many cases, no physician or health professional orders the test

proprietary SNP panels. These screening tests are offered direct-to-consumer in many cases.

I show the multiple problems associated with genetic screening in table 2 (Pearson and Manolio 2008). Of course, to be useful such testing must provide information above and beyond that provided in the patient's history, physical exam, and standard laboratory tests. Take one of the best arguments for genetic testing—that it helps detect the risk of Crohn's disease, which occurs in 0.2 percent of the population. Those with high-risk genes have less than a 4 percent chance of developing this disease (Ioannidis 2009). Moreover, there is nothing you can do to prevent Crohn's. So why bother? However, there are a few people (e.g., women who are at high risk for breast cancer) for whom genetic screening is useful and does affect treatment (Offit 2008).

Another hyped form of genetic testing is pharmacogenetic testing (see table 2) used to improve drug prescribing and outcomes. Take the best example of a drug where pharmacogenetic testing has supposedly benefited patients: the anticoagulant warfarin, which is notoriously tricky to use—in part because different individuals metabolize the drug differently based on genetic differences. However, even knowing the genetic differences through screening doesn't improve the accuracy of warfarin prescriptions in a cost-effective way (Ioannidis 2009).

One editorialist noted that when all of these issues are thoughtfully evaluated, genetic testing (screening) is "too limited, too expensive, and too soon" (Ioannidis 2009).

Deadly Hypothesis Five

Many erroneously believe that **manipulating one's nutrition can prevent cancer.** Specifically, the claim is made that a high dietary intake of vegetables, fruits, fiber, and folate can prevent cancer, especially bowel cancer. In retrospect, this hypothesis does not seem plausible because many populations (e.g., those in northern countries) do not eat many fruits, vegetables, and fiber yet do not suffer from an increased incidence of cancers. However, more than one hundred epidemiology/observation studies (mainly case-control studies in the 1970s and '80s) seemed to support this hypothesis. Cancer rates were as much as 50 percent higher (in those persons who eschewed fruits, vegetables, and fiber) in some studies (Willet 2010). These flawed studies formed the basis of the National Cancer Institute's (NCI) 1991 "5-A-Day" program to increase the average American consumption of fruits and vegetables to five or more servings per day. The NCI also initiated a (fruitless) search for the "protective" phytochemicals in fruits and vegetables (Willet 2010).

However, more recent and careful nutritional research using randomized methodology or careful, large cohort trials have debunked this hypothesis (Willet 2010; Spector 2009). There is no sound evidence that five or more daily servings of fruits and vegetables, large amounts of fiber, or supplemental folate prevent cancer. Here we have parts of the U.S. government (e.g., U.S. Department of Agriculture [USDA] and the NCI) proposing erroneous advice based on outrageously poor science. (Fortunately, the FDA has higher standards.) The consequence of such advice is that people think they are reducing their risk of cancer by eating lots of fruits and vegetables, fiber, and folate, but they are not. The final irony is that (so far) no cancer-preventing phytochemicals have been found in fruits and vegetables: the search for them was doomed because it was based on faulty epidemiology/observation studies (Willet 2010).

Currently, there are new claims that a high intake of fruits and vegetables protects against heart disease (Daucher et al. 2006). Once again, these claims are based on nonrandomized epidemiology/observation studies. These data do not satisfy the Hill criteria for causality and must be taken as—at best—hypothesis generating, not fact. Moreover, there is evidence for publication bias; only the positive studies are published (Daucher et al. 2006). Until proper scientific studies are done, these claims must be considered at best unproven.

Deadly Hypothesis Six

Personalized medicine will greatly advance medical care (Woodcock 2007). By *personalized medicine*, I mean a method to prevent, diagnose, and/or

Table 3
Treatments That Work

Disease	Mode*			Drug Class	Mode of Action†	Generic Example
	1°	2°	Rx			
Heart disease, stroke	Yes	Yes	—	Statins	Uncertain	Simvastatin
High blood pressure	Yes	Yes	Yes	Multiple	Specific	Multiple
Fractures	Yes	Yes	—	Bisphosphonates	Specific	Alendronate
Stomach ulcers	Yes	Yes	Yes	Proton pump inhibitor (PPI)	Specific	Omeprazole
Over fifteen infectious diseases	Yes	—	—	Vaccines	Specific	Multiple

* 1° means primary prevention (prevents initial manifestation of disease); 2° means secondary prevention (prevents recurrence of disease); Rx means treatment. *Yes* means treatment works; — means there is no evidence for efficacy.

† *Specific* means interruption at a defined place in the pathophysiology of the disease. In the case of statins, it is uncertain whether reduction in plasma cholesterol is responsible for the drugs' efficacy.

treat an individual patient with newer, non-routine methods to increase the chance of medical success (e.g., by using genomic tests). In fact, there is often great variability in patients' responses to certain diseases and treatments. This issue complicates treatment and prognosis. As such, personalized medicine is being developed to focus more on the individual patient (in terms of diagnosis, treatment, prognosis, and in many cases prevention), versus the medicine that is currently practiced. Can we anticipate which patients are susceptible to a disease and intervene to stop it? Can we direct an individual patient to a specific optimal therapy? Can we select patients for treatment who have a better or worse prognosis?

Before attempting to fix the current medical system (not ignoring the delivery of health care, which is currently broken), we need to analyze briefly the current state of diagnosis, therapy, prognosis, and prevention to see what is broken. Since World War II, there have been steady advances in many aspects of medicine—especially diagnosis, treatment, and prevention. The success of vaccines to prevent scourges is nothing short of miraculous. Let's focus on five modern useful treatments, including preventive measures such as vaccines (table 3). We understand the diseases and their therapies in table 3 quite well on a causal or a phenomenological level. Vaccines and proton pump inhibitors (PPI) work in essentially all compliant patients; high-blood-pressure drugs, statins, and bisphosphonates also work physiologically or biochemically in almost all compliant patients. In fact, with vaccines and PPI, the physician could not do much better if he had a magic wand. Moreover, not only do these drugs work in essentially everyone, but most patients require only standard doses or a few injections with little titration. The drugs and vaccines listed in table 3 are safe, and the physician does not need to worry about drug absorption, metabolism, or excretion. In short, the benefits are enormous and the risk is minimal. In fact, vaccines have essentially eliminated many individual diseases and classes of diseases (e.g., polio, hepatitis A and B) in all those who are vaccinated. We don't need more personalized medicine with such treatments, though we do need to continue efforts to reach out to those who refuse to vaccinate their children. To make major additional progress, we require a better understanding of the causes of disease and their mechanisms, such as in heart disease and high blood pressure.

Table 4
Potential Areas for Improvement in Medical Care

1) Subgrouping of patients (e.g., male and female, old and young)
2) Drug metabolism and disposition (genetic basis)
3) Disease subsets (e.g., breast cancer, asthma)
4) Monitoring response (e.g., the drug gefitinib in lung cancer)
5) Quality of prescribing (use of generics)
6) Effectiveness studies
7) Genetic forecasting

Where clinical medicine has abjectly failed is in the therapy of cancer and the major brain diseases (e.g., dementias, psychotic disorders). Except for surgery to remove tumors, which sometimes has curative results, we don't understand how to treat most adult cancers effectively (Spector 2010). Similarly, the aforementioned brain diseases are treated symptomatically, often with poor results.

Can more personalized medicine greatly improve the current situation? Proponents say that improvements could be made in several areas (see table 4). I concur that small improvements could be made in some of those areas. In fact, modest improvements have already been made in sub-classifying patients (such as those with breast cancer and certain lymphomas) in terms of prognosis and therapy. Indeed, there is potential to better rationalize drug therapy by increasing the prescribing of generics and using computerized systems, but these are not really products of personalized medicine. Furthermore, we need more comparative scientific evaluations of screening and treatment methods.

However, so far, personalized medicine (e.g., genetic testing and genetic forecasting in predicting drug metabolism in an individual patient) has only been shown to be cost effective in a few well-defined situations (e.g., certain very-high-risk mutations in breast cancer), as noted previously (Offit 2008). Moreover, many of the current personalized monitoring methods in individual patients are known to be less than ideal (e.g., monitoring of tumor size after chemotherapy, because changes in tumor size may have no relationship to patient survival). For example, in some people with lung cancer, the drug gefitinib causes impressive, indeed remarkable, shrinkage of the tumors, but these patients do not live any longer than those who had not taken gefitinib (Woodcock 2007). Thus, in many cases tumor shrinkage *per se* is not a good marker of a patient's overall response. A good therapy should meaningfully prolong life and improve the quality of life at a reasonable cost. We clearly need better markers and treatments for cancer.

The important truth is that many of these problematic situations in medicine occur due to either ignorance or the fact that general improvements in the health care delivery system are needed, not a lack of personalized medicine. For example, when we better understand cancer, we will be able to intervene rationally. Personalized medicine is not the long-term answer. Attempting to improve marginal therapies for individual patients (Spector 2010) has little long-term potential compared to the successful revolutionary changes shown in prevention and treatment (e.g., vaccines and PPI [see table 3]).

Deadly Hypothesis Seven

From a cancer-patient population and public health perspective, **cancer chemotherapy (chemo) has been a major medical advance.** This hypothesis is false.

Two hundred thousand more Americans die of cancer every year today than in 1974, three years after the war on cancer was launched by President Nixon and Congress (see Spector 2010). In fact, the major positive cancer news is that lung cancer has declined appreciably because of the decline in smoking; stomach cancer in the United States has also declined dramatically for unknown reasons.

Of course, there have been a few very successful chemotherapy (and radiation) treatments (e.g., for choriocarcinoma, testicular cancer, Hodgkin's disease), but these patients make up only a small fraction of cancer patients (Spector 2010). In fact, when age- and sex-matched populations are considered, the average cancer patient is only 5 percent better off now than in 1950 (Spector 2010).

The hypothesis behind current cancer chemotherapy is deeply flawed. How can we expect these drugs, most of which are nonspecific cellular poisons, to kill only wily cancer cells and not normal cells? In fact, cancer chemotherapy routinely kills bone marrow and the cell lining of the gastrointestinal tract, with very distressing (indeed sometimes fatal) side effects. From a population perspective, there has been relatively little lengthening of life. Physician David Nathan compares cancer chemotherapy to "carpet bombing," a harsh but apt description (Spector 2010). However, it cannot be denied that there are a few populations for which chemotherapy is marvelously effective, as noted above, and must be used.

Even the newer, so-called "targeted" chemotherapy drugs often have distressing and sometimes fatal side effects (Spector 2010). When one dispassionately weighs the minimal prolongation of "good" life in patients with metastatic cancer (e.g., lung, pancreas, brain, colon, breast) versus the very distressing side effects of chemotherapy with "targeted" drugs, the case is close. Are a few additional months of life, on the average, worth the often terrible price in dollars and side effects in so many cases? It is extremely distressing that we are unable to repeat even the marginal benefits of some of these drugs (e.g., the very expensive and toxic drug bevacizumab [Avastin]) in larger repeat clinical trials (Ioannidis and Karassa 2010). It is absolutely clear that we need a better understanding of cancer before real progress is possible (Varmus 2010).

In many cases tumor shrinkage *per se* is not a good marker of a patient's overall response. A good therapy should meaningfully prolong life and improve the quality of life at a reasonable cost.

Conclusion

Modern medical science has overcome many incorrect hypotheses and harmful practices, including prayer for disease, phlebotomy for fever, and insulin-coma therapy for schizophrenia. We know from bitter experience that unproven hypotheses should be tested and proven before they are widely deployed; this is the standard of the FDA, which generally requires at least two large randomized, controlled studies before approving a drug for marketing. The FDA's rigorous approach has stood the test of time.

Over the past seventy-five years, scientific hypothesis-testing has been continuously refined with great advances in probability theory, biostatistics, and the subsequent extrapolation of results to large groups. Moreover, because it employs the three philosophical criteria for truth (correspondence, coherence, and pragmatic theories), the hypothetical/deductive method used in medical science has been wildly successful (Spector and Vesell 2006).

As I've noted, many of the dangerous consequences of these seven erroneous hypotheses and the waste of the vast quantity of resources used to disprove them could have been avoided if the hypothetical/deductive method had been applied rigorously. In addition, there are several reasons for calling the above seven hypotheses "deadly." First, for example, in the case of HRT use by postmenopausal women, a deadly hypothesis led to an increased incidence of heart disease, stroke, and fatal breast cancer with no countervailing benefit. Second, in the case of nutritional interventions that do not prevent disease, such hypotheses give patients a false sense of reassurance and often prevent them from taking more effective measures. Third, in the case of false beliefs based on erroneous hypotheses, these beliefs often prevent progress or cause the scientific establishment to chase shadows instead of culprits (e.g., phytochemicals in fruits and vegetables to prevent cancer). Finally, the truth is valuable in itself; from bitter experience, we know that the truth "pays."

However, many centrifugal forces work against the hypothetical/deductive approach. These forces include the overuse of easy-to-perform epidemiology/observation studies, which—being nonrandomized—are subject to bias and confounding and therefore often yield incorrect results (Spector and

Vesell 2006). GWAS suffer from the same problems: no hypothesis; nonrandomized control groups, which result in comparisons of uncertain validity; and, so far, tremendous problems with replication of such studies and results that are of uncertain meaning or trivial importance.

Those guilty of perpetuating worthless practices include the "scientists" who repeatedly employ flawed methods and then publish them, government agencies who fund such practices, editors of journals that publish pseudoscience, the USDA and NCI bodies that perpetuate unscientific regimens, the megavitamin and health-product manufacturers who capitalize on bad science, and the members of the media who hype findings without proper evaluation (Spector 2009). More recently, as I've already noted, the marketers of GWAS "products" (putative personalized medicine) have begun selling tests of uncertain utility directly to the public (Wade 2010; Offit 2008). The FDA has reservations about these products but has not yet stopped their sale (Pollack 2010). Both subtle and arrant quackery abound.

The solution, of course, is that the scientific community, government, and media must work together to demand good science and its attendant results. Honest corporations must be enlisted. Most important, regulators must intervene and stop the marketing of unsafe or unproven products. We must keep knocking off the hydra's ever-appearing heads. Although no Hercules is in sight, there is hope. We know better. ■

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Note

1. The standard medical examination consists of taking the personal and family history of the patient and conducting a physical examination, standard laboratory blood tests, a urine analysis, and a baseline electrocardiogram.

References

Ablin, R.J. 2010. The great prostate mistake. *The New York Times*, March 10.

Banks, E., and K. Canfell. 2009. Hormone therapy risks and benefits—The Women's Health Initiative findings and the postmenopausal estrogen timing hypothesis. *American Journal of Epidemiology* 170: 24–28.

Chlebowski, R.T., G.L. Anderson, M. Gass, et al. 2010. Estrogen plus progestin and breast cancer incidence and mortality in postmenopausal women. *Journal of the American Medical Association* 304: 1684–92.

Christen, W.G., R.J. Glynn, E.Y. Chew, et al. 2008. Vitamin E and age-related cataract in a randomized trial of women. *Ophthalmology* 115: 822–29.

Couzin-Frankel, J. 2010. Major heart disease genes prove elusive. *Science* 1220–21.

Daucher, L., P. Amouyel, S. Hercberg, et al. 2006. Fruit and vegetable consumption and risk of coronary heart disease: A meta-analysis of cohort studies. *The Journal of Nutrition* 136: 2588–93.

Glass, D.J., and N. Hall. 2008. A brief history of the hypothesis. *Cell* 134: 378–81.

House, A.A., M. Eliasziw, D.C. Cattran, et al. 2010. Effect of B-vitamin therapy on progression of diabetic nephropathy. *Journal of the American Medical Association* 303: 1603–9.

Ioannidis, J.P.A. 2009. Personalized genetic prediction: Too limited, too expensive, or too soon? *Annals of Internal Medicine* 150: 139–41.

Ioannidis, J.P.A., and F. Karassa. 2010. The need to consider the wider agenda in systematic reviews and meta-analyses. *British Medical Journal* 341: 762–65.

Kalager, M., M. Zelen, F. Langmark, et al. 2010. Effect of screening mammography on breast-cancer mortality in Norway. *New England Journal of Medicine* 363: 1203–10.

Le Fanu, J. 2010. Is modern genetics a blind alley? *British Medical Journal* 340: 1008–9.

Offit, E. 2008. Genomic profiles for disease risk. *Journal of the American Medical Association* 299: 1353–54.

Pearson T., and T.A. Manolio. 2008. How to interpret a genome-wide association study. *Journal of the American Medical Association* 299: 1335–44.

Pedersen N.L. 2010. Reaching the limit of genome-wide significance in Alzheimer disease. *Journal of the American Medical Association* 303: 1864–65.

Perlis, R.H., J.W. Smoller, M.A.R. Ferreira, et al. 2009. A genomewide association study of response to lithium for prevention of recurrence in bipolar disorder. *American Journal of Psychiatry* 166: 718–25.

Pollack, A. 2010. F.D.A. faults companies on unapproved genetic tests. *The New York Times*, June 12.

Prentice R.L., J.E. Manson, R.D. Langer, et al. 2009. Benefits and risks of postmenopausal hormone therapy when it is initiated soon after menopause. *American Journal of Epidemiology* 170: 12–23.

Psychiatric GWAS Consortium Coordinating Committee. 2009. Genomewide association studies: History, rationale, and prospects for psychiatric disorders. *American Journal of Psychiatry* 166: 540–56.

Scandinavian Simvastatin Survival Study Group. 1994. Randomized trial of cholesterol lowering in 4444 patients with coronary heart disease (4S). *Lancet* 344: 1383–89.

Spector, R. 1977. Vitamin homeostasis in the central nervous system. *New England Journal of Medicine* 296: 1393–98.

———. 2009. Science and pseudoscience in adult nutrition research and practice. SKEPTICAL INQUIRER 33(3) (May/June): 35–41.

———. 2010. The war on cancer: A progress report for skeptics. SKEPTICAL INQUIRER 34(1) (January/February): 25–31.

Spector, R., and E. Vesell. 2006. Pharmacology and statistics. *Pharmacology* 78: 113–22.

Varmus, H. 2010. Ten years on: The human genome and medicine. *New England Journal of Medicine* 362: 2028–29.

Wade, N. 2010. A decade later, gene map yields few new cures: Medical uses limited. *The New York Times*, June 13.

Willett, W.C. 2010. Fruits, vegetables, and cancer prevention: Turmoil in the produce section. *Journal of the National Cancer Institute* 102: 510–11.

Woodcock, J. 2007. The prospects for 'personalized medicine' in drug development and drug therapy. *Clinical Pharmacology and Therapeutics* 81: 164–69.

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Intravenous Nutrient Therapy: Cure-All or Just One More Unproven Therapy?

Intravenous nutrient therapy is increasingly popular as a treatment for multiple ailments. But the evidence for the efficacy of IV nutrient treatments is speculative at best.

CLIFFORD W. BENINGER

Recently there has been renewed interest among the general public in the use of intravenous (IV) nutrient therapy to treat a variety of ailments, including chronic fatigue syndrome, depression, fibromyalgia, hay fever, chronic sinusitis, congestive heart failure, ischemic vascular disease, dementia, bronchitis, and multiple sclerosis, as well as viral and bacterial infections.

It has been suggested that serum concentrations of nutrients reach much higher levels with IV therapy than can be achieved through oral consumption. For example, IV-administered vitamin C at 50 g/day can result in blood serum levels of 80 mg/dL, compared to 9.3 mg/dL when administered orally (Gaby 2002). In addition, it is hypothesized that with high-dose and rapid infusions (usually of less than thirty minutes), vitamins and minerals are forced into the cells by overloading the serum and are therefore "trapped" within the cell. This is the suggested explanation for why beneficial effects seem to last long beyond the expected short-term results (Saleeby 2009).

This is the theory behind IV nutrient therapy. However, no proper scientific studies have been published to support these contentions for how IV nutrient therapy actually provides beneficial effects, if any. Although there is no doubt that IV nutrient therapy does result in serum concentrations much higher than can be obtained by oral dosing, there is no evidence to demonstrate that these higher concentrations are beneficial.

There is some evidence that IV therapy with magnesium alone can have beneficial effects in severe acute and chronic cases of asthma (Bichara and Goldman 2009; Noppen 2002; Okayama et al. 1987; Skobeloff et al. 1989; Ciarello et al. 1996; Tiffany et al. 1993) because magnesium is a known bronchodilator, thereby facilitating air flow (Okayama et al. 1987). However, these authors stress that IV therapy with magnesium should be used in addition to traditional beta-agonist and corticosteroid treatment. Yet there have also been studies that did not show improvement in individuals with acute asthma (Clague et al. 1992; Howard et al. 1992; Green and Rothrock 1992).

Two studies—one placebo-controlled (Skobeloff et al. 1989) and the other double-blind placebo-controlled (Ciarello et al. 1996)—of IV treatment of asthma with magnesium produced similar positive results. The placebo-controlled study (Skobeloff et al. 1989) is not rigorous; not only is it not double-blind, but it also suffers from other methodological problems. For example, the study did not have a sample of patients that would control for race and gender. In addition, all the patients treated had been recently treated with a beta-agonist, and the authors state that they "also believed that by studying beta-agonist resistant patients, any effect after magnesium infusion would be related to magnesium and not a delayed effect of the bronchodilator." It is not indicated how long after beta-agonist treatment that IV magnesium treatment began, and this is crucial information necessary to assure that there was no delayed effect of the beta-agonist.

However, there is also a randomized, double-blind placebo-controlled study that clearly shows statistically significant improvement in several measurements (such as peak expiratory flow rate) taken in pediatric patients with acute asthma who were admitted to the emergency department (Ciarello et al. 1996). It is therefore apparent that both the weight of recent evidence and the results of a rigorous double-blind study indicate the benefits of IV treatment with magnesium in treating acute asthma. There is at this time no clear evidence that magnesium treatment is beneficial in chronic fatigue syndrome (Clague et al. 1992), but some authors have indicated that

Table 1
Recipe for a Myers's Cocktail

Ingredient	Dose	Nutrient
Magnesium chloride hexahydrate 20%	2–5 ml	Magnesium
Calcium gluconate 10%	1–3 ml	Calcium
Hydroxocobalamin 1,000 mcg/ml	1 ml	Vitamin B_{12}
Pyridoxine hydrochloride 100 mg/ml	1 ml	Vitamin B_6
Dexpanthenol 250 mg/ml	1 ml	Vitamin B_5
B complex 100	1 ml	Vitamin B complex
Vitamin C 222 mg/ml	4–20 ml	Vitamin C

mcg–microgram, mi–milliliter, mg–milligram.
Credit: Gaby 2002

the patients treated in that study were not magnesium deficient, whereas their own IV magnesium treatment of patients deficient in this ion showed improvement (Howard et al. 1992). However, it is important to note that none of these studies followed rigorous medical trial protocol; they are simply case studies.

Compared with what's available about IV magnesium therapy for asthma, there is a dearth of published scientific literature on the benefits of other types of IV nutrient therapy—not only for asthma but for many of the ailments noted above. The most common IV therapy is known as the Myers's Cocktail; the basic ingredients are indicated in table 1. However, individual doctors may vary the concentrations of each of these ingredients or even add some others. This original formulation was developed by John Myers, MD, a physician from Baltimore, Maryland, who believed that the use of vitamins and minerals should be part of the overall treatment of various medical problems (Gaby 2002).

Many of the ailments I mentioned earlier have been difficult to treat using conventional medicine, so the public is increasingly drawn to alternative medical practices that have not, as yet, been proven in randomized, double-blind trials (in which neither the patients nor the researchers know which is the treatment group and which is the control [placebo] group). This type of trial is the gold standard for determining the efficacy of new drugs and treatments.

In one recent case study (Shrader 2004) that purported to show the beneficial effects of IV nutrient therapy for asthma, there was no placebo control, and the author admits that "although there were no age-matched control patients in this outcome study, and certainly uncontrolled variables, considerable improvement was observed. . . ."

This study was not a double-blind, placebo-controlled experiment. It simply measured percent of improvement or non-improvement as measured by spirometry (pulmonary function testing) in a number of individual case studies over time; therefore it should not be considered a reliable indicator of the possible benefits of IV nutrient therapy in the treatment of asthma. A recent review paper by Myers's Cocktail revivalist Alan R. Gaby (2002) suffers from the same problems as Shrader's study (2004), in that examples of the cocktail's efficacy are located within individual case studies of patients with a range of ailments (as documented by Saleeby [2009]). Gaby's paper is rarely able to cite any rigorous double-blind studies with positive results that had been performed prior to 2002.

A recent voluntary survey study (Padayatta et al. 2010) of complementary and alternative medicine (CAM) practitioners attending conferences in 2006 and 2008 found that high-dose IV vitamin C was in wide use by CAM practitioners to treat the spectrum of conditions mentioned in the Saleeby article (2009). However, this was a voluntary survey, and the CAM practitioners did not have access to their files but merely relied on memory to fill out the survey forms. In addition, due to the very nature of the study, there was no statistical analysis done to verify whether this treatment was efficacious.

One recent study that was a proper double-blind placebo-controlled investigation into IV nutrient therapy for the treatment of fibromyalgia failed to show any statistically significant difference between the control and treatment groups (Ali et al. 2009). In the authors' own words: "Beneficial effects of intravenous vitamin C on the disease conditions for which it is used are unproven, but side effects seem to be minor." Because there was no difference between the placebo group and the treatment group, the authors then went on to point out significant improvement within both groups. This statement means nothing scientifically, and the study's high placebo response and small sample size invalidate any claims of efficacy for this procedure in the treatment of fibromyalgia.

In conclusion, with the exception of IV magnesium therapy for acute asthma and in cases of proven vitamin or mineral deficiency, there is very little hard evidence to support the use of IV nutrient therapy in treating a host of conventionally difficult-to-treat ailments such as those mentioned at the beginning of this article. More rigorous studies, such as that by Ali et al. (2009), are needed to properly determine how efficacious IV nutrient therapy is in the treatment of a variety of diseases. Until these studies are done, we are left with single or multiple case studies that mean little in terms of the scientific basis of medicine. The evidence for IV nutrient therapy is speculative at best, and at worst it is based simply on a placebo effect that helps empty desperately hopeful patients' wallets and purses. ■

References

Ali, Ather, Valentine Y. Njike, Veronica Northrup, et al. 2009. Intravenous micronutrient therapy (Myers' Cocktail) for fibromyalgia: A placebo controlled pilot study. *Journal of Alternative*

and Complementary Medicine 15(3): 247–57.
Bichara, Marcela D., and Ran D. Goldman. 2009. Magnesium for treatment of asthma in children. *Canadian Family Physician* 55(9): 887–89.
Clague, John E., Richard H.T. Edwards, and Malcolm J. Jackson. 1992. Intravenous magnesium loading in chronic fatigue syndrome. *Lancet* 340: 124–25.
Ciarello, Lydia, Andrew H. Sauer, and Michael W. Shannon. 1996. Intravenous magnesium therapy for moderate to severe pediatric asthma: Results of a randomized placebo-controlled trial. *Journal of Pediatrics* 129(6): 809–14.
Gaby, Alan R. 2002. Intravenous nutrient therapy: "The Myers' Cocktail." *Alternative Medicine Review* 7(5): 389–403.
Green, Steven M., and Steven G. Rothrock. 1992. Intravenous magnesium for acute asthma: Failure to decrease emergency treatment duration or need for hospitalization. *Annals of Emergency Medicine* 21(3): 260–65.
Howard, John M., Stephen Davies, and Adrian Hunniset. 1992. Magnesium and chronic fatigue syndrome. *Lancet* 340: 426.
Noppen, Marc. 2002. Magnesium treatment for asthma: Where do we stand? *Chest* 122(2): 396–98.
Okayama, Hiroshi, Takashi Aikawa, Michiko Okayama, et al. 1987. Bronchodilating effect of intravenous magnesium sulphate in bronchial asthma. *Journal of the American Medical Association* 257(8): 1076–78.
Padayatta, Sebastian J., Andrew Y. Sun, Qi Chen, et al. 2010. Vitamin C: Intravenous use by complementary and alternative medicine practitioners and adverse effects. *Public Library of Science* 5(7). Available online at www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0011414.
Saleeby, J.P. 2009. The Myers' Cocktail IV infusion. Available online at http://ezinearticles.com/?The-Myers-Cocktail-IV-Infusion&id=3123197.
Shrader, Welman A., Jr. 2004. Short and long term treatment of asthma with intravenous nutrients. *Nutrition Journal* 3(6): 6. Available online at www.nutritionj.com/content/3/1/6.
Skobeloff, Emil M., William H. Spivey, Robert M. McNamara, et al. 1989. Intravenous magnesium sulphate for the treatment of acute asthma in the emergency department. *Journal of the American Medical Association* 262(9): 1210–13.
Tiffany, Brian R., William A. Berk, Iain K. Todd, et al. 1993. Magnesium bolus or infusion fails to improve expiratory flow in acute asthma exacerbations. *Chest* 104(3): 831–34.

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Do Scientists Know Everything?

KEITH TAYLOR

If you cite science to prove a point, you're sure to be answered with the slur, "Oh, scientists don't know everything." Dissing scientists is easy. Even their workplaces and their clothes are different from anyone else's. Those who work in medical research generally work in rooms so clean the rest of us are afraid to sneeze in them—and if we do, the scientists frown at us. Many wear white masks and white coats. Others, for some arcane reason, wear green clothes. They use words with more letters in them than the rest of us use for entire sentences.

They indeed don't know everything, but they are getting there. Scientists do things a little differently from the rest of us. Rather than constantly proclaim the truth as revealed by a mysterious source or through a breathlessly forwarded e-mail (which we must either forward or delete), scientists have to search for facts. This is difficult in a society where folks generally choose what they want to believe.

The scientific method is a painstaking way to get the right answers. If a person is serious about learning whether a strange occurrence is real or just a bump in the laws of probability, she must first try to prove it wrong. How many of those "miracle cures" we see on the Internet have been subjected to such a test? But is all the skepticism necessary? Yep, and I know from experience. As the program chair for a science-based skeptics group, I talk to a lot of scientists. I even recently got an inside look at science in action.

Keith Taylor is a former president and current program chair of the San Diego Association for Rational Inquiry, a science-based skeptics group.

Some incomplete evidence had indicated that vitamin E plus selenium might deter prostate cancer, a disease that strikes older men like me. If this information were to be substantiated by a thorough study, we might not dread our next prostate exam. A study was conducted at the University of Arizona, looking at the recurrence of skin cancer when vitamin E plus selenium was taken. Another, conducted in Finland, zeroed in on lung cancer and vitamin E plus selenium. Both studies failed in their original premise, but both indicated that the two elements, taken together, might deter prostate cancer.[1] This was just the thing to excite a wheezing geezer like me. I was a semi-retired septuagenarian with enough time to worry about it.

But, wouldn't you know it, rather than run with what some evidence indicated, the scientists had to be sure—and they wanted my help. In fact, the National Cancer Institute (NCI) wanted the help of a whole lot of us, few of whom had the slightest understanding or appreciation of this vaunted scientific method. They even gave the trial a name and always put it in capitals: SELECT.

NCI recruited me and about 35,000 other guys, all over the age of fifty-five, to take part in a double-blind test. Actually, it might have been called a quadruple-blind test. Only one in four participants got both vitamin E and selenium. Each of the other three either got a combination of a placebo with vitamin E or selenium, or they got two placebos. Then the NCI kept track of us and watched what happened.

God in the News Again

MARK LEVY

For about seven years, I dutifully took the NCI's pills along with another dozen already prescribed by my regular doctor. My own hypothesis is that our life expectancy has increased because of the long life spans of all the chemicals we ingest.

After the seven years, SELECT was discontinued. The mysterious guys in white (or maybe green) coats had found that the selenium/vitamin E combination didn't work. My wife claimed I'd wasted my time—a natural reaction. Not so, I insisted! Knowledge is knowledge even if it isn't what we were originally looking for. Believe me, knowing that selenium/vitamin E will not deter cancer is worth the seven years of taking the pills if it'll also deter a deluge of e-mails touting the stuff. Such a deluge would surely be followed by another offering selenium/vitamin E from Canada at discount prices.

Let me share with you a dictum told to me by my favorite scientist, Elie Shneour of the Biosystems Research Institute, who is also a member of half a dozen top science groups including the National Academy of Sciences. Elie said: "A scientist must be able to say two things: *I don't know*. *I was wrong*."

That's a pretty good rejoinder to the comment "Scientists don't know everything." ■

Note

1. Information on the study by the University of Arizona and the one conducted in Finland was verified by the SELECT office in Seattle, Washington.

On a recent television news broadcast, a Boeing 737 jet airliner crash was reported to have taken place on an island in Colombia, South America. The aircraft slammed down 300 feet from the runway like a very large winged rock. The fuselage broke into three ragged parts, with flames shooting out, just like in the movies. Its terminal speed was estimated to be 150 miles per hour. Decelerating from 150 to zero in less than a second must make riding your average roller coaster seem like standing still, but only one passenger died out of 131 passengers and crew members.

In the same broadcast, a tragic off-road truck race in California's Mojave Desert was reported. The off-road event ended when a highly modified truck, moving at more than three times the legal speed limit, careened off a dirt path and rolled over into the crowd. Eight spectators were killed.

Lately, news reporters seem to work extra hard to find tragedy survivors who thank God for their survival within a pithy sound bite. This seems to be a common theme and favorite reporting technique. No doubt bleeding-heart, godless TV producers are behind this technique, satisfying their perverse sense of heretical irony.

"Thank God," one hears a survivor of a Kansas tornado exclaim in the ruins of the trailer park where he once resided, "my little pooch, Toto, is still alive."

Or, "It's a miracle," a survivor observes after a train wreck kills or maims seventy-one people. "My great grandmother's special needlepoint of Elvis performing in Vegas is still intact. It's an heirloom."

Mark Levy is an intellectual property attorney in private practice. He holds a BS degree in physics from the Polytechnic Institute of New York University, a JD from New York Law School, and an MA in creative writing from Wilkes University in Pennsylvania.

If you're a theist, you ought to acknowledge, at least occasionally, that God is responsible for terrible events as well as miraculous ones.

Or, "At least my valuable stamp collection is unscathed," says a flood victim whose entire house and other worldly possessions teetered over the edge of a cliff into the Pacific Ocean. "Thank God for that."

And so it was with the recent airplane mishap in Colombia. There were 114 people injured in addition to the single fatality, but sure enough, a reporter located the Caribbean island's governor, who said, "It was extraordinary that almost everyone survived. It was a miracle and we have to give thanks to God."

This is not an isolated incident. If there's a catastrophe, God is to be thanked thoroughly for some inconsequential silver lining to it. If there's a disaster, God be praised. If there's a hurricane, a flood, or a tornado, someone will surely pop up to testify that a miracle occurred. Apparently there is always someone who can identify the positive thing God does—however obscure and unimportant—and heap praise on him for it.

Now, you didn't hear anyone actually give credit to God for allowing the eight bystanders at the sandy, off-track racecourse to perish, but you have to believe someone has something nice to say about the deity. The reporters must still be looking for him. The girlfriend of one of the deceased, erstwhile enthusiasts said, "It just isn't fair; it isn't right." That's about as close to a condemnation of God as you are likely to hear, on or off the air.

So why don't people ever blame God for disasters? Some survivors are quick to thank God when tragedy strikes, but you can't find a believer who hates or curses him. If you're a theist, you ought to acknowledge, at least occasionally, that God is responsible for terrible events as well as miraculous ones. As Mark Twain observed, whatever thing God wishes to do, however grand or insignificant, he can do that thing without anyone's assistance. But a snowball has a better chance in hell than you have of hearing a true believer say something less than flattering about the ultimate supernatural superhero.

Again, Mark Twain noted—and I wouldn't quote him so much if he weren't so logical—that the leaders of organized religion don't know how to reconcile these grotesque contradictions, and they don't even try.

The reason, I think, has to do with the Ten Commandments, which—as legend has it—were dictated by God to Moses well before airplanes and off-road races. Right near the top of the Ten Commandments, sitting in the second or third position (depending on your religious sect)—ahead of lying, stealing, and murdering—is the suggestion that if you believe in God, you can't berate him. The words are "Thou shalt not take the name of the Lord in vain." So you see, the deck is stacked. Even if you suspect that some fatal accident is God's fault, you can't call him on it. The very supernatural being you want to blame has already set the ground rules to prohibit you from doing so. It's nothing short of a brilliant plan.

Maybe God is less than omnipotent—maybe he's incompetent, inattentive, immoral, or even vindictive and vengeful—but he is certainly not stupid. At least he wasn't when he had that famous mountaintop chat with Moses. ■

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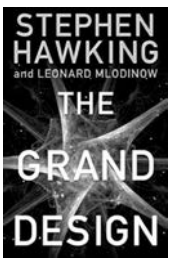
For more information, contact Sherry Rook, vice president of planning and development, at 716-636-1425 ext. 427. All inquiries are held in the strictest confidence.

A Little Too Grand?

JUSTIN TROTTIER



The Grand Design
By Stephen Hawking and Leonard Mlodinow. Random House Publishing Group, New York, 2010. ISBN: 978-0-80537-6. 208 pp. Hardcover, $28.

"Philosophy is dead." When most people speak these words, they can be readily dismissed for their naiveté. But when Stephen Hawking, the world's most famous living scientist, makes such a pronouncement in the second paragraph of his new book—*The Grand Design*, co-authored with Caltech physicist Leonard Mlodinow—many people will listen, and quite a few of them might then be tempted to buy the book.

Curiously, Hawking makes a foray into philosophy only two pages later as he introduces the notion of model-dependent realism. According to this view, there can be no fundamental meaning to the concept of absolute truth beyond what our best physical theories tell us. This logic leads to the seemingly bizarre possibility of there being two equally real theories with completely different kinds of explanations, as long as they make equally accurate predictions. Although this contribution to the philosophy of science is certainly a valuable one, the manner in which such philosophizing permeates the book stands out starkly against Hawking's opening obituary on that very discipline.

Theology, too, is headed for the dustbin: "The scientific account is complete. Theology is unnecessary," Hawking said while speaking about his book on *Larry King Live*. Richard Dawkins backed this up, stating that Hawking's book "finishes off God. Darwin kicked him out of biology, but physics remained more uncertain. Hawking is now administering the *coup de grace*."

I certainly agree with such statements, and I am excited at the prospect of uniting philosophy, physics, and theology. But *The Grand Design* is rather deficient in any meaty arguments that might begin to back up such weighty assertions, and it provides few references to other books or articles that would provide this missing content. In the absence of such arguments, the authors' statements may come across as simplistic and dogmatic. The book's imagery also bears this out. Even though the images are colorful and aesthetic, they contribute little to the reader's deeper understanding of the concepts presented.

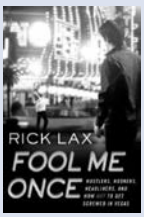
It's difficult to admit all this. I admire Hawking as much as anyone, both for his personal battles and for his professional accomplishments. However, this new book appears to be aimed mostly at taking advantage of the instant market generated for any book that makes brazen comments about God. The additional mix of short, rehashed commentary on the search for a "theory of everything" is correspondingly superficial and has been better told in many other works, such as *The Elegant Universe* by Brian Greene and *Universe on a T-Shirt* by Dan Falk.

That the commentary about God was the main motivation for the book is evidenced by the marketing campaign that was waged for it—which was certainly brilliant, considering the instant, if dismissive, reaction voiced by leading Jewish, Catholic, Anglican, and Muslim leaders.

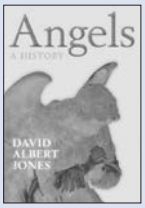
NEW BOOKS

Listing does not preclude future review.

FOOL ME ONCE: Hustlers, Hookers, Headliners, and How Not to Get Screwed in Vegas. Rick Lax. St. Martin's Press, New York. 2011. 304 pp. Paperback, $14.99. Rick Lax, a magician, raconteur, would-be lawyer, and staff writer at the *Las Vegas Weekly*, takes his readers on a wild ride around Las Vegas. Why? "I headed to Las Vegas to meet deceivers, befriend them, watch them in action, learn from their tricks, and learn to protect myself," Lax writes. He covers a lot of ground, from magicians (including Lance Burton, Criss Angel, and Penn and Teller) to card counters and women of dubious virtue. Of particular interest to skeptics are the sections dealing with deception—how magicians fool us and how we fool ourselves. Lax obliquely cites some interesting studies on psychology, lying, and deception (including work by Professor Richard Wiseman and others) and applies the lessons learned to his experiences in Las Vegas. Some of the material is interesting, some of it less so. His claimed naiveté regarding hot women in Las Vegas is less than convincing. Some—even otherwise ordinary and nice girls that you might want to have a relationship with—make their money by sleeping with rich men? *Shocking!* Lax is at his best when discussing con games (like three-card Monte) and magic. *Fool Me Once* is an uneven but often funny memoir with a decidedly skeptical bent.

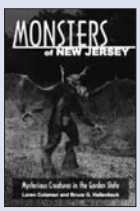


ANGELS: A History. David Albert Jones. Oxford University Press, New York. 2010. 224 pp. Hardcover, $19.95. Despite centuries of theological speculation about angels—from their hierarchies to how many can dance on the head of a pin—no one knows if they exist. Many people believe they do: polls suggest that nearly 70 percent of Americans think angels exist, and 32 percent claim that they



have personally felt an angelic presence. David Jones, Professor of Bioethics at St. Mary's University College in England, notes that though angels are said to dwell in heaven, their visits to the earthly realm are not always benevolent. Biblical angels not only comfort and heal but also wage warfare, lay siege to cities, and kill people. The archangel Michael, for example, is often depicted as the leader of God's Army, destroying enemies with his terrible powers and flaming sword. Overall, *Angels* is a fascinating survey of the topic, touching on nearly every aspect of angels in theology, philosophy, and popular culture.

MONSTERS OF NEW JERSEY: Mysterious Creatures in the Garden State. Loren Coleman and Bruce G. Hallenbeck. Stackpole Books, Mechanicsburg, PA. 2010. 144 pp. Paperback, $12.95. Loren Coleman, director of the International Cryptozoology Museum in Portland, Maine, is one of the world's top writers on mysterious creatures such as Bigfoot and lake monsters. In his new book *Monsters of New Jersey*, Coleman teams up with New York writer Bruce Hallenbeck to address some of New Jersey's mystery creatures. In its opening chapter "The Jersey Devil," the book provides one of the best (and most thorough) analyses of the creature (of which Coleman "remains open-mindedly skeptical"). Coleman and Hallenbeck tackle dozens of other monstrosities in seven more chapters: "More Winged Wonders and the Wooo-Wooo"; "Big Red Eye and Other Garden State Giants"; "Hoboken Monkey-Man and Urban Unknowns"; "Cape May Sea Serpent and Marine Monsters"; "Lake Hopatog Horror and Other Freshwater Weirdies"; "Lizardmen and Various Vicious Reptilians"; and "The Ultimate New Jersey Monster." As you can tell from this list, the book is a hodgepodge of various mysteries and monsters. The book is littered with far too many anonymous and quasi-anonymous reports, often culled from another book, *Weird New Jersey* by Mark Moran and Mark Sceurman: "Mike V. recounts his experience…"; "Another report from an eyewitness who prefers to remain anonymous…"; "Two witnesses who call themselves 'MS' and 'RS' recalled a sighting…" and so on. Who are these people? Do they even exist? Presumably so, but good research de-



To be fair, Hawking may have thought it necessary to release such a book to clarify his earlier published views on God. In *A Brief History of Time*, he gave ambiguous but not totally dismissive views on the role of God in creating the cosmos, stating: "If we discover a complete theory, it would be the ultimate triumph of human reason—for then we should know the mind of God."

The book's climactic moment [is] somewhat satisfying, but it's far too brief.

But in *The Grand Design*, Hawking and Mlodinow leave little room for ambiguity, stating, "M-theory predicts that a great many universes were created out of nothing. Their creation does not require the intervention of some supernatural being or god. Rather, these multiple universes arise naturally from physical law."

Spoiler alert: The highlight of *The Grand Design*, in my opinion, is a short two-and-a-half-page section at the very end in which the authors explain why there must be gravity and how a universe can spring into existence from nothing. Essentially, the positive energy of all matter in the universe and the negative energy of the gravitational force associated with that matter can precisely balance so that the total universe has zero combined energy. However, on the scale of anything less than an entire universe, such as that of planets or stars, the negative energy of gravity is far too small compared to the positive energy of matter, and hence spontaneous creation of bodies *within* a universe is impossible. This is the book's climactic moment. It's somewhat satisfying, but it's far too brief.

Tellingly, critics of *The Grand Design* don't just fall in the religious camp. Philosophers and scientists also criticize the science behind such simple all-encompassing pronouncements. Perhaps the loudest is from physicist and astronomer Marcelo Gleiser, author of the recently released book *A Tear at the Edge of Creation*. Gleiser commented on Hawking and Mlodinow's book for the Australian Broadcasting Corporation: "The search for an all-embracing theory of Nature inspired by beauty and perfection is misguided, rooted in the monotheistic culture that has for so long dominated Western thought."

But in all fairness, this critique seems to make too much of Hawking's words, as here might be the one place where he does show humility. Although Hawking does take for granted that string or M-theory is the only real candidate for a "theory of everything"—and he is certainly in the unification business—he comes out stating that there may be limits on such ambitions: "Each theory in the M-theory network is good at describing phenomena within a certain range. Wherever their ranges overlap, the various theories in the network agree, so they can all be said to be parts of the same theory. But no single theory within the network can describe every aspect of the universe."

It may be a sign of how far science has come that even Stephen Hawking—who appears to some to arrogantly assume, in often brazen and simple language, that science can unify all knowledge of the universe—still admits there are some limits to our ability to achieve the sort of unification we've long dreamed of. ■

Justin Trottier is the national executive director of the Center for Inquiry in Canada and a contributor to the *National Post* and the *Michael Coren Show* on CTS TV. He was the chief spokesperson for the Canadian Atheist Bus Campaign, and he has spoken on atheism, skepticism, and free inquiry on all major Canadian television networks.

‘Unexplained’ Cases–Only If You Ignore All Explanations

ROBERT SHEAFFER

UFOs: Generals, Pilots, and Government Officials Go on the Record
By Leslie Kean. Harmony Books, New York, 2010. ISBN: 978-0-307-71684-2. 335 pp. Hardcover, $25.99.

While UFO believers have held for decades that “disclosure” is just around the corner, the modern disclosure movement is savvy enough to realize that “disclosure” needs a little push. On May 9, 2001, Steven Greer’s Disclosure Project held a press conference at the National Press Club in Washington, D.C., featuring twenty people who have made claims of a widespread government conspiracy to conceal the existence of extraterrestrial visitors. After a brief flurry of sensationalist news reports, the mainstream news media simply ignored what Greer and his pals had to say, and nobody followed through on it. The Disclosure Project folks expected that enterprising news reporters would follow up on their leads, blowing the whole supposed government UFO conspiracy sky-high through diligent investigation. However, it didn’t happen, because no experienced reporter believed there was anything in the UFO conspiracy claims worth following up on.

Enter Leslie Kean (pronounced “Kane”), a reporter for Public Broadcasting Service station KPFA in Berkeley, California, widely known as the radical radio voice of the Peoples’ Republic of Berkeley. Leslie Kean is the reporter the Disclosure Project has been waiting for. She says her initiation into the ranks of UFO proponents occurred in 1999 when she was given a copy of a French UFO report called COMETA, which is usually described as a report commissioned by defense officials but was in fact written by a private group. Like Bentham upon reading Hume, the “scales fell from [her] eyes,” and she suddenly realized the reality of UFOs as unknown flying vehicles. She has no doubts whatsoever that the government is hiding something *really big* from us concerning UFOs, although she professes (a bit disingenuously) to be agnostic on the question of whether they are extraterrestrial.

Of the COMETA report, she says: “All conventional explanations of something natural or man-made had been eliminated by the authors and their associated teams of experts, and yet these objects were observed at close range by pilots, tracked on radar, and officially photographed.” Really? Among the COMETA cases supposedly having no possible explanation was one at Lakenheath, United Kingdom, in 1956—but this case is the subject of Chapter 21 of the 1974 book *UFOs Explained* (Random House) by the famous UFO skeptic and late CSICOP fellow Philip J. Klass. What does Kean say about Klass’s demolishing of the “evidence” presented? Nothing. Klass’s name does not appear in the book’s index. Kean writes a chapter on “The Roots of UFO Debunking in America,” but she does not even mention Klass, the late astronomer Donald Menzel, or CSICOP or anyone associated with it. To her, it’s all the fault of the government: the United States Air Force (USAF) and especially the once-secret 1953 Robertson Panel of the Central Intelligence Agency.

Another COMETA “unexplained” event is the RB-47 case of 1957. That case fills Chapters 19 and 20 of Klass’s 1974 book. Kean tells us that Jimmy Carter “had his own UFO sighting in mands—and cryptozoology deserves—far more than brief anecdotes from anonymous eyewitnesses. One drawback of the book (especially for anyone wishing to use it as a resource) is the lack of references or even an index. Especially in a book with chapters that are often collections of various reports on various monsters, an index would have been invaluable. With its limitations in mind, the book is definitely worth a look for cryptozoology enthusiasts.

THE OTHER SIDE: A Teen’s Guide to Ghost Hunting and the Paranormal. Marley Gibson, Patrick Burns, and Dave Schrader. Houghton Mifflin, New York. 2010. 112 pp. Paperback, $10.99. A recent addition to the explosion of ghost books aimed at teens, *The Other Side* deems itself a practical guide to ghost hunting and the paranormal. Often the book’s authors are refreshingly candid about the ambiguous nature of paranormal investigation in general and ghost hunting specifically. “No one is a paranormal expert,” they note in the introduction. “There are a multitude of paranormal investigators with differing philosophies on how to investigate. No one can truly say that his or her methods are better than anyone else’s. Not even we can.” (I would argue that those investigative methods that actually solve mysteries are self-evidently better than others.) The book covers a variety of claims for ghosts, ranging from orbs and EVPs (electronic voice phenomena, supposed ghost voices) to safety during investigations. The authors, all well-known personalities in the ghost-hunting world, actually provide some pretty sensible advice, for example knowing your surroundings, seeking permission to investigate a supposedly haunted location, and understanding how your equipment works. I was pleasantly surprised to find other bits of investigative wisdom, including not wearing reflective clothing, shiny jewelry, or hard-soled shoes—all of which can create false-positive “ghost evidence.” Other parts of the book (e.g., casting spells to protect from evil spirits) keep the woo-detecting needle pinned firmly on the B.S. side. The authors (who call themselves “skeptics”) are clearly operating on a different set of principles and assumptions than CSI-affiliated investigators do. *The Other Side* is definitely a mixed bag, but it’s somewhat more skeptical than one might expect and is useful as a primer in understanding ghost investigation from a “believer’s” perspective.

— Benjamin Radford

1969, before he became governor of Georgia." What she does not tell her readers is that it has been known for over thirty years that Carter's "UFO" was in the same position as Venus (see my analysis of the Carter sighting in Chapter 2 of my *UFO Sightings: The Evidence* [Prometheus Books, 1998]).

Kean also likes a list compiled by another French UFOlogist, Dominique Weinstein, consisting of 1,305 "cases for which adequate data is available to categorize the [objects] as unknowns." UFO skeptic and CSI fellow James Oberg glanced at that list and quickly pulled out ten cases that he knew were caused by Russian space launches (see Oberg's "UFO Book Based on Questionable Foundation" at www.msnbc.msn.com/id/38852385).

There seems to be a pattern here. It's easy to tout UFO cases as having no conventional explanation as long as you completely ignore everything that's been written to the contrary. Surely even radical Berkeley reporters must actually investigate controversial claims—and sometimes even interview the token Republican to get an opposing view—even when they already "know for sure" what the answer is. I cannot imagine what caused Citizen Kean to forget her professional training and become an innocent lamb in accepting pro-UFO claims, but clearly she is the reporter whom UFO proponents have been waiting for, the Chosen One who will lead UFOlogy from the wilderness of isolation and despair into the media spotlight. She calls upon the U.S. government to set up a new UFO agency—it can be a small one, she reassures us—to monitor, collect, and investigate UFO reports.

Kean invited several contributors to write chapters describing UFO incidents they had some involvement in. She begins with the chapter "Majestic Craft with Powerful Beaming Spotlights," concerning the famous Belgian UFO wave of 1989, as written by Major General Wilfred de Brower of the Belgian Air Force (Ret.). It started with two policemen reporting a bright light in the sky. Soon reports of UFOs were coming in from all over the region. Many of the UFOs were reported as triangular, and it was widely assumed that the U.S. was testing some kind of secret aircraft—over Belgium! Jets were sent up in pursuit, but no solid radar or visual contacts were established. In fact, despite widespread sightings, by the time the Belgian UFO craze was over, the only provided "evidence" was a single blurred color image. The photo unfortunately shows nothing in the background that can be used for analysis.

Kean is sensitive to the criticism that there ought to have been much more photographic evidence, given so many sightings. She lamely suggests that "twenty years ago, cell phones and relatively inexpensive, consumer-level digital and video cameras were not yet in use" (true, but we had plenty of film cameras) and also that the dearth of photos "was likely due to the effect of infrared light around the UFO, which can cause even such an object to disappear altogether in a photograph," which if true suggests that burglars can disappear from surveillance cameras by carrying an infrared light. She ignores a skeptical analysis showing that the policemen's original UFO was reported in the same position as Venus, that some of the early Belgian sightings were from a light show at a disco, and that the sole color photo could easily be duplicated using cards and spotlights, as illustrated in Wim Van Utrecht's analysis "The Belgian 1989–1990 UFO Wave" in *UFOs 1947–1997: From Arnold to the Abductees*, edited by Hilary Evans and Dennis Stacy (London: John Brown Publishing, 1997). And even if Kean didn't know of Van Utrecht's skeptical research, de Brower certainly did, because he was interviewed by Van Utrecht.

Another contributor is the retired Iranian General Parviz Jafari, who describes his own "UFO dogfight" experience in chasing a supposed UFO over the skies of Teheran in 1976 (back when Iran was a U.S. ally). Jafari tells of chasing—in an American-built F-4—an unknown object that looked "similar to a star, but bigger and brighter." This was almost certainly Jupiter. The object allegedly induced failures in the aircraft's electronics. This case, also a COMETA "unexplained," is the subject of Chapter 11 of Klass's 1983 book *UFOs: The Public Deceived* (Prometheus Books). Klass, an authority on avionics ("aviation electronics"—indeed he is credited with coining the term), described known issues with the F-4's avionics that could likely cause the problems Jafari reported.

A second similar case from 1980 is described in the chapter "Close Combat with a UFO," written by Commandante Oscar Santa Maria Huertas of the Peruvian Air Force (Ret.). Neither Kean nor any of her contributors evince any familiarity with the classic 1948 Lieutenant George F. Gorman "UFO dogfight" documented in USAF Project Blue Book files, in which this North Dakota Air National Guard pilot apparently played cat-and-mouse with a lighted weather balloon known to have been launched nearby ten minutes earlier (in Donald Menzel and Lyle G. Boyd, *The World of Flying Saucers,* Doubleday, 1963). There is no reason to suspect that the "UFO dogfights" in Iran and Peru were very different.

Another of Kean's big cases took place in Rendlesham, United Kingdom, in 1980. This case is sometimes called the "British Roswell," although the incident is a claimed landing, not a crash, near a USAF base in Britain. The British skeptic Ian Ridpath has a website discussing the many problems with this case, which Kean ignores. Her contributor, Sergeant James Penniston, USAF (Ret.), displays his notebook with drawings supposedly made during the incident, while Colonel Charles I. Halt, USAF (Ret.), suggests that Air Force Office of Special Investigations personnel secretly came onto the base and interrogated witnesses, covertly using sodium pentothal to brainwash them and erase their memories. Kean doesn't tell us that Penniston's notebook was never seen publicly until twenty-three years after the incident, suggest-

ing its authenticity is very dubious. Penniston also has elsewhere stated his belief that the beings that landed in Rendlesham Forest were our distant descendants returning to obtain genetic material to keep their ailing species alive: "They are time travellers. They are us." As for Halt, his credibility on the case has suffered greatly, especially considering his recent affidavit that flatly contradicts many of his original statements (see Ian Ridpath's 2010 article "The Rendlesham Forest UFO Case," available at www.ianridpath.com/ufo/rendlesham.htm).

Kean is enormously impressed by pilots' sightings, which she describes as "a unique window into the unknown." She writes that pilots "represent the world's most experienced and best-trained observers of everything that flies . . . these unique circumstances potentially transform any jet aircraft into a specialized flying laboratory for the study of rare anomalous phenomena." However, J. Allen Hynek, the late Project Blue Book consultant whom Kean repeatedly cites as a respected UFO authority, came to exactly the opposite conclusion. On page 271 of his 1977 book *The Hynek UFO Report*, he wrote, "Surprisingly, commercial and military pilots appear to make relatively poor witnesses." Kean actually quotes from other pages of that book but makes absolutely no mention of Hynek's low opinion of pilots' sightings. This is perhaps the clearest example of Kean's habit of totally ignoring everything in the UFO literature that disagrees with her beliefs. ■

Robert Sheaffer, a Committee for Skeptical Inquiry fellow and longtime SKEPTICAL INQUIRER contributing editor and columnist, is one of the world's leading UFO debunkers. He is author of *UFO Sightings: The Evidence* (Prometheus Books, 1998). His new blog is online at www.BadUFOs.com.

Padre Pio: Scandals of a Saint

JOE NICKELL

From humble beginnings in the town of Pietrelcina, Italy, Francesco Forgione (1887–1968) went on to become Italy's most venerated saint of the twenty-first century, known popularly as Padre ("Father") Pio ("Pious"). His tomb draws more pilgrims than Lourdes or any other Catholic shrine. Yet the full, true story of this purported miracle worker's rise to sainthood has long needed to be told, and Sergio Luzzatto tells it in his *Padre Pio: Miracles and Politics in a Secular Age*. (First published in 2007, this is a new English translation.) As the book's subtitle suggests, Luzzatto details Pio's fascist (he was reportedly an admirer of Mussolini) and other connections, although in this review I concentrate on the allegedly paranormal aspects of Pio's life.

Padre Pio: Miracles and Politics in a Secular Age
By Sergio Luzzatto. Metropolitan Books, Henry Holt and Company, New York, 2010.
ISBN: 978-0-8050-8905-9. 384 pp. Hardcover, $30.

Pio is best known for his stigmata—the supposedly supernaturally received wounds resembling the wounds of Jesus—which he first exhibited in the autumn of 1918 when the trauma of World War I caused many to hope for supernatural intervention. Suddenly, at a Capuchin monastery in southern Italy, an *alter Christus* (living figure of Christ) was manifest. While praying before the chapel's crucifix, the newly ordained priest was suddenly, he claimed, inflicted with the stigmata—bleeding so profusely, he alleged, that he feared he would bleed to death.

In fact, notwithstanding the claims in uncritical biographies, Pio's stigmata devolved—from bleeding wounds that could easily have been self-inflicted (like those of many fake stigmatists before and after, as I described in my 2001 book *Real-Life X-Files*) to merely discolored skin that appeared to have been irritated by the application of a caustic substance. Indeed, a bottle of carbolic acid was once discovered in the friar's cell, and Luzzatto cites letters from Padre Pio in which Pio requests that carbolic acid, and at another time a caustic alkaloid, be secretly delivered to him. Eventually Pio began wearing fingerless gloves, supposedly to cover

While praying before the chapel's crucifix, the newly ordained priest was suddenly, he claimed, inflicted with the stigmata—bleeding so profusely, he alleged, that he feared he would bleed to death.

his stigmata out of pious humility; however, to me, the practice seems instead a shrewd move to eliminate the need to continually self-inflict wounds.

Nor were the fake stigmata the friar's only deception. Years before, Pio had written numerous letters to his spiritual directors describing his mystical experiences; however, it is now known that he copied these words verbatim from the writings of stigmatic Gemma Galgani (1878–1903) without acknowledging they were hers. And that is not all: Pio attempted to divert suspicion from his plagiarism by asking for help in procuring copies of Galgani's books—saying he would very much like to read them!

As to miracles attributed to Pio, the report of a Vatican emissary in 1919 cited the wildest claims then circulating among an uneducated populace. The emissary characterized as fantasy the story of a church bell that fragmented when Pio's confreres were wronged by a superior. Likewise, it was not true that Pio instantly cured a man of a limp; nor had he caused a deaf-mute girl to regain her speech. He also did not heal a hunchback so the man could walk away "at least partly made straight." Not a single one of Padre Pio's miracles was genuine, the investigator determined.

Nevertheless, Padre Pio's reputation grew unabated, and ultimately "miracles" would be found to serve as the basis for his canonization. A once-hostile Vatican had eventually become conciliatory toward him and responsive to popular demand—this despite evidence that suggested sexual misconduct on behalf of the adored padre and the private opinion of Pope John XXIII (recorded in his daybook) that "P.P. has shown himself to be a straw idol."

By the time of his death in 1968, Pio's stigmata had disappeared, but that was effectively remedied in death. Although there was no need to cover his hands and feet—and indeed Capuchin rule forbids the wearing of socks—Pio's "father guardian," Father Carmelo of San Giovanni in Galdo, worried that the absence of stigmata might cause a faulty rush to judgment. Carmelo therefore had Padre Pio's hands and feet covered, as if the covering still concealed his allegedly holy gift. And so the deception continued.

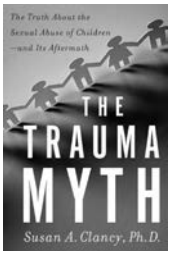
In 2002, the late friar was canonized Saint Pio of Pietrelcina—not for the stigmata he was so famous for but for his healings that were, with due illogic, assumed miraculous because they were said to be inexplicable. And when his remains were exhumed for display forty years after his death, those hoping his body would be found incorrupt (a supposed sign of sanctity; see my *Relics of the Christ*, University Press of Kentucky, 2007), or that it would still exhibit the stigmata, were disappointed. The embalmed corpse had deteriorated sufficiently that it required a silicon mask—complete with bushy eyebrows and beard—fashioned by a London wax museum. Of the supposedly supernatural wounds there was not a trace. ■

Debunking the Trauma Myth

BENJAMIN RADFORD

A friend of mine once told me about something that had happened to her in her early teens. An adult friend of her parents had nonviolently (but quite clearly) sexually abused her. I was of course very sympathetic and told her she didn't need to tell me any more than she was comfortable with. I certainly didn't want the relating of the experience to trigger emotional trauma.

Instead, she more or less shrugged the experience off. She did not downplay her abuse; she was merely ambivalent about it. She related the event as a slightly embarrassing and uncomfortable experience that left no physical injuries at the time and no apparent emotional trauma afterward. She was not okay with what happened to her, but the experience didn't scar her for life or leave deep emotional wounds. For her it was just one of life's many unpleasant (but not traumatic) experiences.



The Trauma Myth: The Truth About the Sexual Abuse of Children—and Its Aftermath
By Susan A. Clancy. Basic Books, New York, 2010. ISBN: 978-0-465-01688-4. 256 pp. Hardcover, $25.

Her reaction seemed strange to me: it was at odds with both what I'd learned in my undergraduate psychology courses and the common conception about the nature of sexual abuse. But I was not about to tell her how to feel or impose my own interpretations on her; I was in no position to judge or question her reaction to her own experience.

I didn't really know what to make of my friend's experience and her feelings about it until I read Susan Clancy's new book *The Trauma Myth: The Truth About the Sexual Abuse of Children—and Its Aftermath*. Clancy, a research psychologist, is best known to skeptics as author of the 2007 book *Abducted: How People Come to Believe They Were Kidnapped by Aliens*, which provides a fascinating look at the psychology of abduction experiences. This time Clancy turns her investigative acumen to child sexual abuse (CSA).

The book is divided into five chapters: "What Was It Like When It Hap-

pened?"; "The Truth About Sexual Abuse"; "The Politics of Sexual Abuse"; "Why the Trauma Myth Damages Victims"; and "How the Trauma Myth Silences Victims." Each chapter flows clearly and logically into the next, bringing the reader along a captivating journey through the theory, research, and politics of CSA.

Clancy calls for a reevaluation of the dominant framework with which CSA has been interpreted and studied for decades. The "trauma model," which is widely used both in pop culture and among psychologists, holds that such abuse is invariably traumatic for the child at the time of the abuse.

Clancy does an admirable job of combining personal stories and hard data. As a scientist, she realizes that stories and anecdotes carry only so much weight. Clancy describes the results of her research: "Almost every victim I spoke with reported that their childhood sexual experiences had damaged them. . . . Most reported multiple adverse effects from the abuse" (p. 22). However, Clancy states, "The second commonality between the victims I did not expect. Whatever was causing the psychological and cognitive damage these victims reported had nothing to do with trauma; very few victims reported any fear, shock, force, or violence at the time the abuse occurred" (22). In fact, in the final analysis, "Less than 10 percent of the participants reported experiencing their abuse as traumatic, terrifying, overwhelming, life-threatening, or shocking at the time it happened" (37).

Clancy takes repeated pains to emphasize that she "never once questioned whether sexual abuse hurts victims . . ." (78). Instead, "the point of [her] research was not to minimize the harm abuse causes but to question our assumptions about what the cause of the harm really is" (79). An event does not need to be physically or psychologically traumatic at the time to cause harm later on—the real harm is manifested in depression, mistrust, and other issues. When some defenders of the trauma model were unable to find good evidence of their claims, they had a ready-made (albeit pseudoscientific) explanation: the traumatic memories had been repressed.

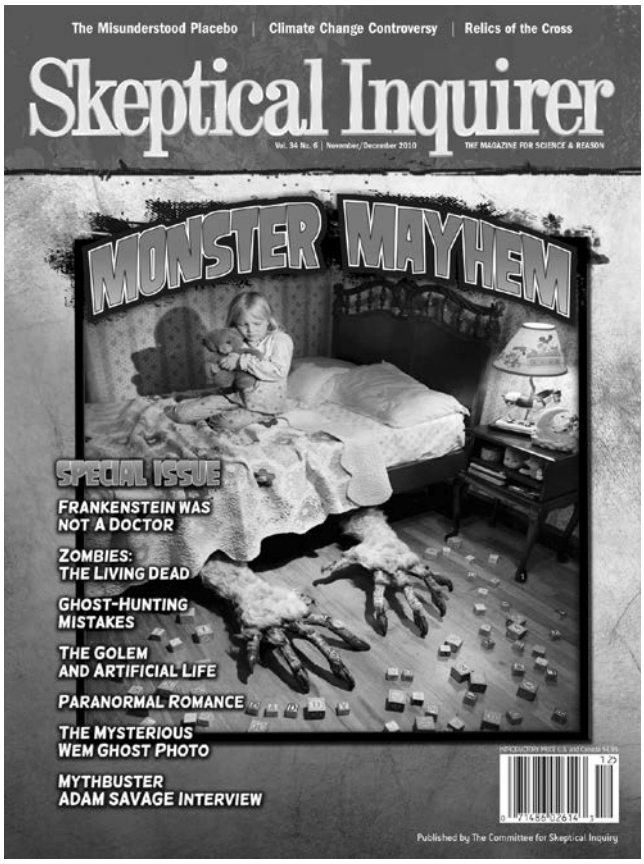
Especially on a topic as emotionally and politically charged as CSA, it's easy to misread and misunderstand Clancy's points. Her argument is nuanced and easily mischaracterized. She has been attacked and vilified, not only by believers in repressed memory but by other researchers who blithely assume—without offering better evidence of their own—that her findings cannot be correct. Though Clancy is among the first to write publicly about this, she is not alone in her findings; indeed, she draws upon a wealth of published studies that support her conclusions. Clancy's intellectual rigor is remarkable, and the book contains meticulous reference lists and notes.

Clancy describes the role that feminists played in creating and perpetuating the trauma myth: "How to explain the fact that victims themselves said that they rarely resisted the abuse, they often participated, and that most chose not to report what happened and kept silent about their experiences? The feminist solution was to conceptualize sexual abuse as a violent crime, to treat sexual abuse the same way they treated rape" (91). This profound misunderstanding—this trauma myth driven by politics instead of science, social agendas instead of evidence—would eventually cause significant harm to the very victims feminists were trying to protect.

Clancy illustrates the vast gulf between the public's image of CSA (rooted in the trauma model) and reality. "Virtually every commentator shares the view that the sexual abuse was horrific when it happened, and, as a consequence, profoundly damaging to the victim. Not surprisingly, when we read about sexual abuse in the news . . . it is almost always in the context of lurid, sensational stories having to do with subjects" such as priests molesting choir boys, *To Catch a Predator*-type Internet stalkers, and so on. Yet, Clancy shows, these cultural scripts describe and represent only a very narrow subset of CSA experiences and victims. This traumatic sort of abuse was not typical of Clancy's subjects—or of my friend. One result is that most victims of sexual abuse do not see their experiences represented or validated in the culture, which may even lead to some abuse cases not being reported. Victims may see depictions of forcible or violent abuse and assume that it is typical—and because they did not experience anything like that, they may come to believe that they were not in fact abused.

As Clancy notes, "The reason truth matters—the reason advocacy is in fact best based on truth—is that our lies about sexual abuse are not helping victims. . . . Based on what victims have to say, professionals in the mental health field have not made much progress for them" (108). We cannot find answers if we do not ask the right questions. If the premises and assumptions underlying our understanding of sexual abuse are flawed, then we cannot hope to find effective solutions to prevent such abuse. For millennia, illnesses were thought to be the result of an imbalance of bodily humors (bile, blood, etc.); to correct those imbalances, physicians used knives and leeches to drain excess humors. At the time, such treatment was perfectly logical and rational, based upon a (mis)understanding of the problem. Perhaps decades from now, psychologists will shake their heads in dismay at why it took so long to bring science and evidence to the treatment of CSA.

The Trauma Myth is a brave, insightful, and important book with implications far beyond psychology. It is also a fascinating study of how politics and political correctness can contaminate good science. Clancy has shown that the emperor may have no clothes—and the belief that he does is hurting real victims. It is possible that people like my friend, and those who Clancy found in her research, are rare exceptions in CSA. Even if that is true, their experiences are no less valid or worthy of study. All victims deserve good science and accurate answers.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SPECIAL ISSUE
FRANKENSTEIN WAS NOT A DOCTOR
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Ghost-Hunters' Mistakes

I want to commend Benjamin Radford for the restraint he showed in his dismantling of ghost-hunting techniques ("Ghost-Hunting Mistakes," SI, November/December 2010).

The self-proclaimed "skeptics" at T.A.P.S., The Atlantic Paranormal Society, declare an allegiance to "science," but their methodology is so staggeringly inane that they are redefining the terms *skepticism* and *science* in the public's mind to mean much less than they do. The group's sole contribution is to etymology: their entire investigative schtick is so absurd that it redefines *ghostwriting* to include the phenomenon wherein a writer's subject is so full of holes that his critique pretty much writes itself.

In addressing this orgy of pseudoscience, Radford could have done what other critics have: he could have illustrated the mistakes and then skewered them with hilariously funny—but off-putting—insults. While his piece might have been funnier, it would have been ignored by any of the show's believers who dared read it. Although most of them will likely not read it anyway, those who do have a chance to hear what he's actually saying because they won't go instantly on the defensive.

To this end, Radford's efforts help restore *skepticism* and *science* to their original, higher meanings. I only hope his latest book on the subject assumes this same tone.

Ross Bonander
Austin, Texas

I read Benjamin Radford's article on "Ghost-Hunting Mistakes" in the special monster issue of SI, and I want to applaud and thank him for a well-balanced and well-written article full of facts and educated observations. I am a veteran paranormal investigator (I don't like the term *ghost hunter* for multiple reasons) of fourteen years and am happy to see such a well-written article from the hardcore skeptical side. Unfortunately, I doubt those who need to read it ever will! It's so frustrating to see a lack of critical thinking in this field, but what's even more perplexing is talking to many other investigators who feel the same way but do nothing to change their methods or help educate others.

I have written a blog post about my positive reaction to your article and given full credit to Radford and the SKEPTICAL INQUIRER. It's available at http://tiny.cc/h67hg.

Brian D. Parsons
Ohio Paranormal Investigation Network
opin2u@gmail.com

I very much enjoyed reading "Ghost-Hunting Mistakes," and I'd like to add a few thoughts of my own.

Concerning electronic voice phenomena (EVPs), it's interesting to me that a hundred-dollar handheld digital recorder can capture these whispering "voices," which the ghost hunters later analyze with computer software. Meanwhile, the show's sound man, standing only a few feet away at the time, apparently records none with his thousands of dollars' worth of sophisticated, professional-grade audio-recording equipment.

Having made a living for the past thirty-one years in the communications industry, it's not surprising to me that ghost hunters find electromagnetic field (EMF) readings everywhere they look. Each radio transmission is by definition an electromagnetic source, and these investigators bring a variety of EMF devices with them. Indiscriminate use of cell phones, wireless cameras, handheld two-way radios, wireless microphones, infrared LEDs in night-vision cameras, as well as the expected local internal and external EMF sources (not to mention their inevitable reflections) can add up to a busy night of ghost hunting in any location, aided by the fact that solar interference doesn't mask the weaker emissions as it does in daylight. Radio signals from outside the "haunted" structure, including the nearest wi-fi hotspot or the baby monitor next door, could be available for misinterpretation as a local spirit.

Ron Smith
Alpine, Texas

Frankenstein

In his article "Frankenstein Was Not a Doctor" (SI, November/December 2010), Ron Watkins states that in the 1931 movie, Dr. Frankenstein tells the monster to "Take care, Herr Frankenstein, take care!" Actually, in the scene when Dr. Frankenstein first introduces the monster to sunlight, it is Dr. Waldman (who is off-screen) who tells Dr. Frankenstein to take care, as the latter inches closer to the monster when it reaches up to the sunlight.

Other than this error, the article is interesting and well written.

Thomas DeZego
Richmond, Virginia

In the November/December 2010 SI, both Ron Watkins's article "Frankenstein Was Not a Doctor" and Massimo Polidoro's column "How to Make a Monster! The Legend of Creating Artificial Life: From the Golem to Pinocchio" reference Mary Shelley's *Frankenstein*. Readers should know that the charming town of Frankenstein lies a pleasant drive west from Heidelberg. Sited high on a crag overlooking the town, the ruins of Castle Frankenstein occupy a setting even more impressive than the one depicted in the films: a small automated weather station sits on the highest point of the ruins, and,

yes, it does include a lightning rod. Interestingly, insofar as I could discover while walking the length of the town, there is not a single shop that sells so much as a postcard related to the book or films. Unlike the tourist trade in Romania, which caters to fans of Dracula, the local burghers of Frankenstein have not turned the name of their community into a cottage industry.

Alan Dean Foster
Prescott, Arizona

In Defense of Reason

The November/December 2010 issue of the SKEPTICAL INQUIRER, with a spooky cover and articles on ghosts and monsters, arrived in the mail in late October just in time for Halloween. Is this a coincidence or a result of intelligent design?

In the issue's "An Open Letter in Defense of Reason," Tomasz Witkowski criticizes the Polish minister of labor for listing *fortune-teller* as an occupation along with an uncritical description of it. He provides the labor minister's reply but still expresses concern that such a listing will legitimize fortune-tellers, dowsers, and astrologers and could logically lead to the same for criminal professions, such as prostitute, drug dealer, and contract thug.

Witkowski's report leads one to wonder how the U.S. Department of Labor treats such occupations. Fortunately, the *Dictionary of Occupational Titles* (DOT), published by the U.S. Department of Labor, is now available online.

Fortune-teller is defined with a touch of skepticism:

> **PSYCHIC READER (amuse. & rec.)** Entertains client or audience by professing to tell past, present, or future events through extraordinary spiritual insight or by perceiving another's thoughts. Designated according to specialty or medium used as Card Reader (amuse. & rec.); Crystal Gazer (amuse. & rec.); Fortune Teller (amuse. & rec.); Mind Reader (amuse. & rec.); Palmist (amuse. & rec.); Tea-Leaf Reader (amuse. & rec.).

Astrologer is defined matter-of-factly:

> **ASTROLOGER (amuse. & rec.)** Prepares and analyzes horoscope to advise clients regarding future trends and events: Prepares horoscope by computing position of planets, their relationship to each other and to zodiacal signs, based on factors, such as time and place subject was born. Analyzes horoscope chart to advise client, such as person or company, regarding conditions which lie ahead, course of action to follow, and probability of success or failure of that action.

Both *fortune-teller* and *astrologer* are placed in the category of Amusement and Recreation, which suggests that they should not be taken too seriously. James Randi would be pleased that *magician* is also considered an occupation:

> "**MAGICIAN (amuse. & rec.)** Performs original and stock tricks of illusion and sleight of hand to entertain and mystify audience, using props, such as illusion boxes, scarf, cards, rabbit, and jewelry. . . ."

Medium is not listed as an occupation. Neither *ghost hunter* nor *ghostwriter* are listed as occupations, but *poet* is listed. *Dowser* is not listed, nor is *cosmologist* or *skeptic*; perhaps because so few can earn a living at them. Illegal jobs such as *prostitute* and *drug dealer* are probably unlisted because most of their practitioners "take the Fifth."

If one wants to have fun looking deeper into what the U.S. Department of Labor does and does not define as an occupation, search online for "Dictionary of Occupational Titles" and then search for any occupations of interest.

David W. Briggs
Marion, Massachusetts

In the SI Special Report, "An Open Letter in Defense of Reason," author Tomasz Witkowski's reasoning is quite well articulated. I particularly liked his point that certain "professions"—just as clearly represented among the subject population as were fortune-tellers, for example—were omitted from the survey. The article mentioned, among others, *racketeer* and *prostitute*.

I would like to point out, however, that there was a whole classification of occupations that were undoubtedly mentioned in the Polish classification of occupations that would present just as great a problem as the one mentioned by Mr. Witkowski: "What if, for example, the Polish Supreme Court were to allow establishing a forensic expert in the area of fortune-telling, astrology, bioenergy therapy, or similar specialization on the same grounds as other forensic experts?" I am referring to the classification of religious officials, such as *minister, priest, rabbi,* etc. I assume there is some such classification or classifications in the Polish government's document.

Certainly an opinion expressed in a Polish court by one of these "holy men" is subject to the same problems as the opinions of clairvoyants. I only point this out as perhaps an additional problem with the construction of the Polish government's classification that Mr. Witkowski perhaps saw but did not mention.

Donald Havis
San Mateo, California

Tri-Country Evolution Poll

I was truly depressed by the results of the evolution poll (News and Comment, SI, November/December 2010). Only 35 percent of people in the United States believe that human beings evolved from less advanced life-forms over millions of years—and even worse, in my native South, only 27 percent believe it.

More than any other cause, I think you have to assign blame to the school systems and the people who end up teaching our children. Colleges of Education attract students with the lowest SAT examination results, and they become the "science educators." We would have better teachers if we recruited more students with science degrees. The best science teachers I ever had were my college professors, not one of whom had ever sat through an education course.

Marilyn Williams Finke
mfinke1@verizon.net

Human beings evolved from *less advanced* life-forms? Who's to say what's "advanced"? Some extremophiles—who might resemble our ancestors!—thrive at temperatures of over 70°C. We can't do that. This isn't the first time this issue has come up, and pollsters ought to phrase their questions differently if they want to accurately gauge the acceptance of evolution.

Howard J. Wilk
Philadelphia, Pennsylvania

The Misunderstood Placebo

Steven Novella may indeed be knowledgeable, but he is a bit disingenuous in his column "The Poor, Misunderstood Placebo" in the November/December 2010 issue. He relegates placebos to their role in clinical trials, but of course placebos have been around since the dawn of medicine. In fact, up until the mid-twentieth century, placebos were likely the most effective remedies in a doctor's kit. Before antibiotics came on the scene in the 1930s, there were few effective remedies for disease, and doctors depended on their own calming presence and a variety of questionable or worthless pills and nostrums to provide the patient with a feeling that he or she was being treated. Then they relied on

time and the quite marvelous healing power of the human body to do the rest. It wasn't a whole lot different than a shaman shaking a rattle and doing the spiritual two-step to chase away demons. They were selling belief, and belief works. It calms the patient, reducing the fear and the stress-related influx of cortisol, adrenaline, and noradrenaline, which inhibit the immune system. It improves the body's ability to use its innate self-healing power.

The truth is that doctors still depend on the placebo effect. They turned penicillin and other antibiotics into placebos by treating them as panaceas and prescribing them for every sort of patient complaint, including viral diseases for which they could have no effect. Many a person has collected an antibiotic prescription for a troublesome rhinovirus. The over-prescribing of antibiotics is so prevalent that many pathogenic microorganisms have evolved to be multiresistant. The tendency of doctors to hand out prescriptions with little regard to their efficacy is precisely why pharmaceutical companies include in their advertising, "Ask your doctor if XYZ is right for you." They know that doctors who will deny a patient a drug request are few and far between.

A great many medical treatments are basically placebos. Arthroscopic surgery to repair the meniscus was revealed to be "no better than a placebo" in a study released in 2008 (Alexandra Kirkley et al., "A Randomized Trial of Arthroscopic Surgery for Osteoarthritis of the Knee," *New England Journal of Medicine* 359(11): 1097–107). (This was actually the second such study to deliver that result; see Bruce Moseley et al., "A Controlled Trial of Arthroscopic Surgery for Osteoarthritis of the Knee," *New England Journal of Medicine* 347(2): 81–88.) Yet these operations continue today. Low back surgery is often simply a placebo. Some claim that is also true of many hysterectomies, prostate removals, and coronary-bypass surgeries. The truth is that patients often have symptoms that are ambiguous or for which there is no recognized efficacious treatment. Doctors can't send these patients away with nothing, so they prescribe a placebo treatment or perform a placebo procedure and trust that the power of the white coat and time will help the patient recover. When it comes to hocus-pocus, doctors can match any shaman. And when they latch onto a high-visibility apparent panacea—like penicillin was in the '30s or statins are today—they don't hesitate to use it for its placebo effect.

Robert Veitch
Minneapolis, Minnesota

I was enlightened by Dr. Steven Novella's dissection of the constituent parts of the placebo effect, although I must confess I gained no real insight into the nature of this strange phenomenon. And we were left with the curious conclusion: "On close inspection, placebo effects are not a justification for substituting hocus-pocus for real medicine."

Novella is careful to acknowledge "the real physiological effects" of "nonspecific benefits," such as surges of endorphins and increase in elaboration of dopamine, either of which may produce a salutary effect in treating a disease.

Does Novella contend that "warmth, attention, and confidence" do not have a physiological correlate? The mechanism of action of many contemporary, allopathic remedies describes merely epiphenomena for some and is simply unknown for many others. I believe that a 60 percent salutary effect of "sham acupuncture with enhanced interaction" represents a remarkably efficacious result, and I would not dismiss it lightly—even though we don't understand it.

William Harvey
wharvey1@me.com

A synopsis of a paper in the October 19 *Annals of Internal Medicine* appears on Science Daily (see www.sciencedaily.com/rleases/2010/10/101018174335.htm). The purpose of the article is to see if paper authors have published the contents of placebo pills or potions used in their studies. The authors of the October paper contend that there is no placebo that is not physiologically active. Therefore, the makeup is very important to know if it can affect the trial results significantly. Fewer than 10 percent of papers reviewed listed placebo ingredients.

James Reagan
Cary, North Carolina

Steven Novella, MD, replies:

While I agree with many of the facts to which Mr. Veitch refers, he is not actually responding to anything I wrote in my article. Prior to science-based medicine, medical practice was indeed mostly placebo medicine. Yet this did not add measurably to the human life expectancy, so it is hardly something to be touted or yearned for. That some physicians today rely upon placebo effects is true (although overstated by Veitch), but this is also not relevant to any point made in my article. The calming and reassuring effects of the therapeutic interaction are legitimate parts of medical practice, but they are not sufficient in and of themselves to justify a specific intervention that does not itself carry specific efficacy.

William Harvey misses the point of my article. My objection to relying on placebo effects has nothing to do with whether or not we understand mechanisms of action. Rather, the evidence shows that much of what we measure as placebo effects is illusory and artifactual, and any real benefits are modest and subjective. Further he misunderstands the notion of "efficacy"—if acupuncture plus a therapeutic interaction has the same effect as the therapeutic interaction itself, then the acupuncture isn't adding any efficacy. The treatment is therefore unnecessary and arguably unethical; furthermore, the lack of specific efficacy mitigates any need to speculate about possible mechanisms of the acupuncture itself.

James Reagan brings up an interesting study that was published after I had submitted my article, but I did write about it at http://theness.com/neurologicablog/?p=2415. I agree that transparency in clinical trial methods is essential, and the authors point to the need to more uniformly disclose precise placebo contents.

Great Promulgations

I read Joe Nickell's "Investigative Files" column "The True Cross: Chaucer, Calvin, and the Relic Mongers" (November/December 2010) with interest and enjoyment.

One quibble: Constantine the Great (274–337) did not make "…Christianity the Roman Empire's official religion …" (p. 20). Constantine promulgated an Edict of Toleration that did just that—stopped persecution and tolerated Christianity as one among other oriental and mystery cults.

It was later, in the reign of Theodosius the Great (379–395), that Christianity became the Roman Empire's official religion. Thus, other religions and beliefs were denied a right to exist.

John James Cahill
Alexandria, Virginia

Joe Nickell replies:

Point taken, but now it is I who quibble: Constantine didn't treat Christianity as just one among many religions. He famously converted to Christianity; adopted the Greek monogram for Christ as his imperial standard, which was placed on his soldiers' shields; went to battle with his brother-in-law to end the persecution of Christians; and is recognized as being instrumental in making Christianity the West's dominant religion. While Constantine made

Christianity semi-official, it was indeed Theodosius whose command made it official. Thanks for the correction.

Mechanical Automatons Go Way Back

Great piece by Massimo Polidoro ("How to Make a Monster! The Legend of Creating Artificial Life: From the Golem to Pinocchio," SI, November/December 2010), but there is one slight error (on pp. 22–23). Polidoro writes, "It was in the Middle Ages that technology allowed people to not only imagine but to build the first mechanical automatons."

This buys into a recent narrative that the ancient world lacked the technology of the Middle Ages, but that narrative is entirely false. Actual robots were already being built and operated in the fourth century BCE, and Aristotle (who uses them as an analogy in *On the Motion of Animals*) imagined the possibility of using robots to eliminate the need for slaves and menial labor (*Politics*). Both reports probably predate any Jewish legend of the golem.

Manuals on how to build actual robots were written at least as early as the third century BCE (*On Building Automatons* by Philo of Byzantium). We even have one such manual, *On Automata*, by the Roman engineer Hero of Alexandria (from the first century CE), who said he was updating Philo's work. These robots did the same things medieval robots did, acting out entire plays and scenes (including not just performing dramatic encounters but engaging in battles, working hammers and saws, rigging and rowing ships, flying through the air, lighting fires, opening and closing doors, and playing musical instruments). They were programmed using a system of cogs, lines, and wheels, which were set in motion (like a game of Mouse Trap) using a static weight. Some public religious processions even featured elaborate floats on which robots acted the part of the god, and some even boasted displays of robotic cars (although they probably were powered by men concealed within).

Actual industrial robots were developed and used by the Greeks and Romans as well: not only the water mill (which automated the grinding of grain) but water-powered saws (for cutting wood and stone), hammers (for crushing ore), and other forms of automation.

Richard Carrier
www.richardcarrier.info

Massimo Polidoro writes: "In 'Sandman' (1815), writer E.T.A. Hoffmann told the story of a love between a man and a mechanical doll. *The Steam Man of the Prairies* (1815), a dime novel by Edward S. Ellis, is about a big mechanical steam man used to carry coaches across prairies," and "Luis Senarens . . . in 1885 imagined the first mechanical man activated by electricity in his book *Frank Reade and His Electric Man.* The following year, Frenchman Mathias Villiers de l'Isle-Adam first used the word *android* in a novel."

There are several significant errors here.

Hoffmann's "The Sandman" is usually dated 1816 or 1817; it was first published in *Nachstücke herausgegeben von dem Vergasser der Fantasiestücke in Callots Manier*, the first volume of which appeared in 1816.

Although it had received earlier publication, the work generally considered to be the first dime novel was the 1860 edition of Mrs. Ann Stephens's *Malaeska, the Indian Wife of the White Hunter*. Edward S. Ellis's *The Steam Man of the Prairies* was not published until 1868.

Minimal research would show Polidoro that the word *android* had been used—in English—in 1727.

Richard Bleiler
richardbleiler@yahoo.com

Massimo Polidoro replies:

I thank Richard Carrier for his very interesting letter, and I'd like to thank Richard Bleiler for taking the time to correct my dates. Living in Italy, I did not have a chance to locate the original novel, so I got my information on those books from Wikipedia. That information turned out to be wrong (I have checked now, and the dates have been corrected online as well). As for the word android, *I only said "the first time it was used in a novel," not the first time it was used in anything at all.*

A Climate of Irony

David Morrison, in his review of three climate-science books (SI, November/December 2010), notes that Jim Hansen's fame as a climate scientist is ironic "given Hansen's midwestern roots, his careful approach to science, and his conservative, shy personality."

Perhaps it is ironic that a shy person became a famous climate scientist, but I fail to see how the other factors enter into the irony equation. I hope he is not suggesting that fame comes only to those scientists who are extroverted liberals with a careless approach to science and who hail from anywhere but the midwestern United States.

Mark Phillippi
Sioux Falls, South Dakota

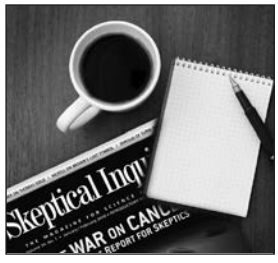
[FOR THE RECORD

The affiliation for Kenneth L. Feder, author of the *Encyclopedia of Dubious Archaeology* (New Books, January/February 2011), is Central Connecticut State University (not College).

* * *

The mysterious light clusters over Manhattan identified as balloons released from a teacher's party (News and Comment, January/February 2011) were seen October 13 (not 14), 2010. Also, regarding the UFO investigated years earlier in Buffalo, New York, the sentence should have read: "We determined that those lights were caused by white latex balloons."

[FEEDBACK



The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as e-mail text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to Letter to the Editor, 944 Deer Dr. NE, Albuquerque, NM 87122, or fax it to 505-828-2080.

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Ten Possible Positive Consequences of Global Warming

1. During this great flood we'll know how to build arks; directions are in the Bible—in English.
2. Ice caps will no longer block our view of the other side of the world.
3. Inner city neighborhoods will finally have access to formerly exclusive beachfront property.
4. Displaced polar bears will move south and become domesticated, cuddly house pets!
5. There will be nothing left for future *Titanic*s to crash into.
6. Wanting nothing more to do with the "ugly" planet, UFOs will pass Earth by.
7. Drastic reduction of forests means Smokey the Bear can finally retire.
8. There will be an end of mundane, out-of-date species and the creation of new mind-blowing mutations.
9. Remaining humans will form a cult that worships a god by the name of Gore.
10. Those predicting the apocalypse or "end of days" will no longer sound like delusional crackpots.

HIDDEN MESSAGES by Dave Thomas

The following letters are a simple substitution cipher. If R stands for L, it will do so everywhere. Solution is by trial and error. Hint: Look for patterns in words; for example, the scrambled phrase "JRXJ JRQ" might represent "THAT THE."

PUZZLE

"BNI CHFE DITACH OCD BGXI GA AC BNTB IUIDEBNGHW KCIAH'B NTVVIH TB CHQI."

—TFYIDB IGHABIGH

CLUE: O = F

PREVIOUS PUZZLE SOLUTION: ***"TIME IS A GREAT TEACHER, BUT UNFORTUNATELY IT KILLS ALL ITS PUPILS."***

— LOUIS HECTOR BERLIOZ

SUPER-SECRET WORD: SCREAMING
(Instructions: www.nmsr.org/secretword.htm)

January/February 2011 Hidden Messages Puzzle Contest Winner: **Stan Kurzban**. This issue's prize is a one-year gift subscription to the Skeptical Inquirer.

Skeptical Shutterbug

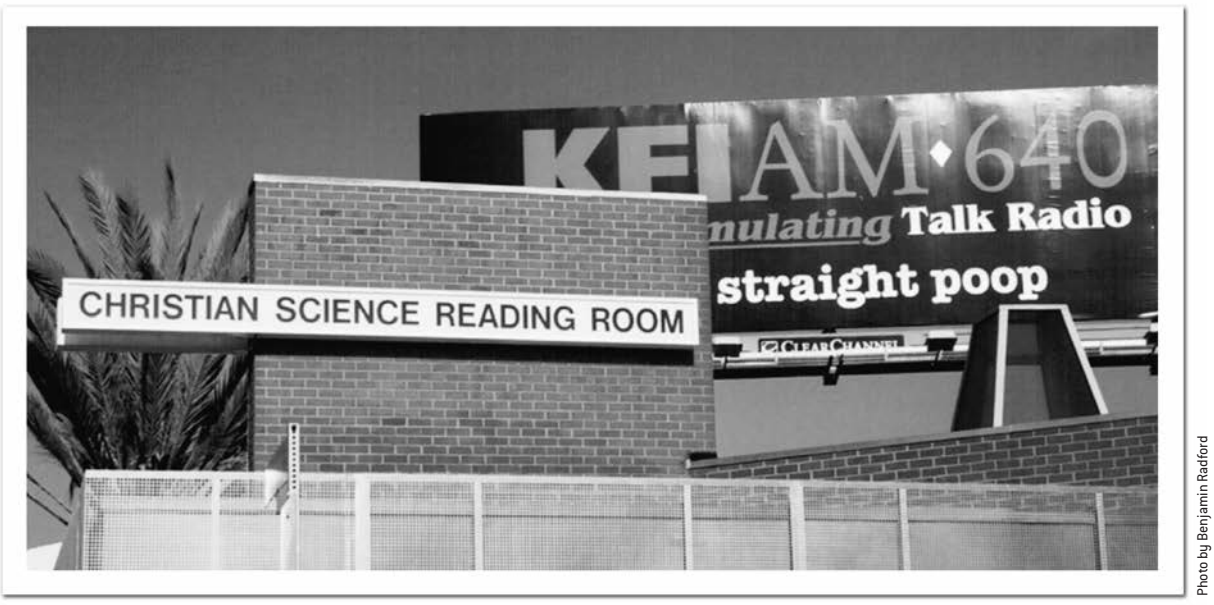

Photo by Benjamin Radford

Skeptical Shutterbug wants your humorous, skeptical snapshots! Please send only photos you have personally taken via e-mail to bradford@centerforinquiry.net or by postal mail to Benjamin Radford, The Last Laugh, P.O. Box 3016, Corrales, NM 87048.

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